AutoSelect™
AS50 Autosampler (USB)
Operator's Manual

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1 • Introduction

1.1 Overview

The Dionex AutoSelect™ AS50 Autosampler precisely delivers from 1.0 to 99.9 μL (in 0.1 μL increments) or 100 to 1000 μL (in 1 μL increments) of sample to an injection valve.

If the AS50 is equipped with the simultaneous injection option, the AS50 delivers sample to two injection valves in two independent ion chromatography (IC) systems. With the simultaneous injection option, the AS50 delivers from 1000 μL to 5000 μL of sample (if the 5 mL syringe is installed) or up to 8000 μL (if the 10 mL syringe is installed). The sample is delivered equally to the two IC systems (half of the volume to each).

Two types of trays are available for sample vials: one for 1.5 mL vials and one for 10 mL vials. During sampling, the tray remains stationary and a sampling needle arm moves from vial to vial. Up to 99 injections can be taken from each vial.

The AS50 can be controlled locally, from the front panel keypad and display, or remotely, with a personal computer running Windows® 2000 or Windows XP and Chromeleon® Chromatography Data Management System software (Release 6.6 or later). Limited remote control is also available, using TTL and relay signals.

For communication between the AS50 and Chromeleon, the AS50 is connected to a USB (Universal Serial Bus) port on the computer, a USB hub, or on another Dionex module (for example, an ICS-2000).

1.2 About This Manual

Chapter 1 Introduction	Introduces the AS50; explains the conventions used in this manual, including safety-related information.
Chapter 2 Features Overview	Describes the AS50 operating features and system components; provides the theory of operation.
Chapter 3 Operation and Maintenance	Provides operating instructions using the AS50 front panel buttons and screens and describes routine preventive maintenance procedures.
Chapter 4 Troubleshooting	Lists problems and presents step-by-step procedures for how to isolate and eliminate the cause of each problem.
Chapter 5 Service	Provides step-by-step instructions for routine service and parts replacement procedures that the user can perform.
Appendix A Specifications	Lists the AS50 specifications and installation site requirements.
Appendix B Installation	Describes how to install the AS50.
Chapter C Display Screens	Describes the front panel operational and diagnostic display screens.
Appendix D TTL and Relay Control	Describes the AS50 TTL and relay control features.
Appendix E Simultaneous Injection	Describes the features of the simultaneous injection option and provides setup and operating instructions.
Appendix F Unpacking Instructions	Provides step-by-step instructions for removing the AS50 from its shipping box and packing materials.

> **NOTE** **For instructions on using Chromeleon software to operate the AS50, refer to the Chromeleon user's guide or online Help. The user's guide is on the Dionex Reference Library CD-ROM (P/N 053891), located in the AS50 Ship Kit (P/N 061270 or P/N 061271).**

1.2.1 Safety Messages and Notes

This manual contains warnings and precautionary statements that can prevent personal injury and/or damage to the AS50 when properly followed. Safety messages appear in bold type and are accompanied by icons, as shown below.

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. Also used to identify a situation or practice that may seriously damage the instrument, but will not cause injury.

Indicates that the function or process of the instrument may be impaired. Operation does not constitute a hazard.

Messages d'avertissement en français

Signale une situation de danger immédiat qui, si elle n'est pas évitée, entraînera des blessures graves à mortelles.

Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures graves à mortelles.

Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures à modérées. Également utilisé pour signaler une situation ou une pratique qui pourrait gravement endommager l'instrument mais qui n'entraînera pas de blessures.

Warnhinweise in Deutsch

Bedeutet unmittelbare Gefahr. Mißachtung kann zum Tod oder schwerwiegenden Verletzungen führen.

Bedeutet eine mögliche Gefährdung. Mißachtung kann zum Tod oder schwerwiegenden Verletzungen führen.

Bedeutet eine mögliche Gefährdung. Mißachtung kann zu kleineren oder mittelschweren Verletzungen führen. Wird auch verwendet, wenn eine Situation zu schweren Schäden am Gerät führen kann, jedoch keine Verletzungsgefahr besteht.

Notes

Informational messages also appear throughout this manual. These are labeled NOTE and are in bold type:

NOTE   NOTES call attention to certain information. They alert you to an unexpected result of an action, suggest how to optimize instrument performance, etc.

1.2.2   Safety Labels

The TUV GS, C, US Mark safety label and the CE Mark label on the AS50 indicate that the AS50 is in compliance with the following standards: EN 61010-1:2001 (safety), CAN/CSA-C22.2 No. 1010.1-92+A2:97 (safety), UL 61010C-1:2002 R8.02 (safety), and EN 61326:1997+A1:1998 (EMC susceptibility and immunity).

The symbols below appear on the AS50 or on AS50 labels.

$\sim$ Alternating current

Protective conductor terminal (earth ground)

Power supply is on

Power supply is off

Indicates a potential hazard. Refer to the operator's manual for an explanation of the hazard and how to proceed.

2 • Description

2.1 Overview of Features

[Figure 2-1](#) illustrates the main features of the AutoSelect AS50 Autosampler.
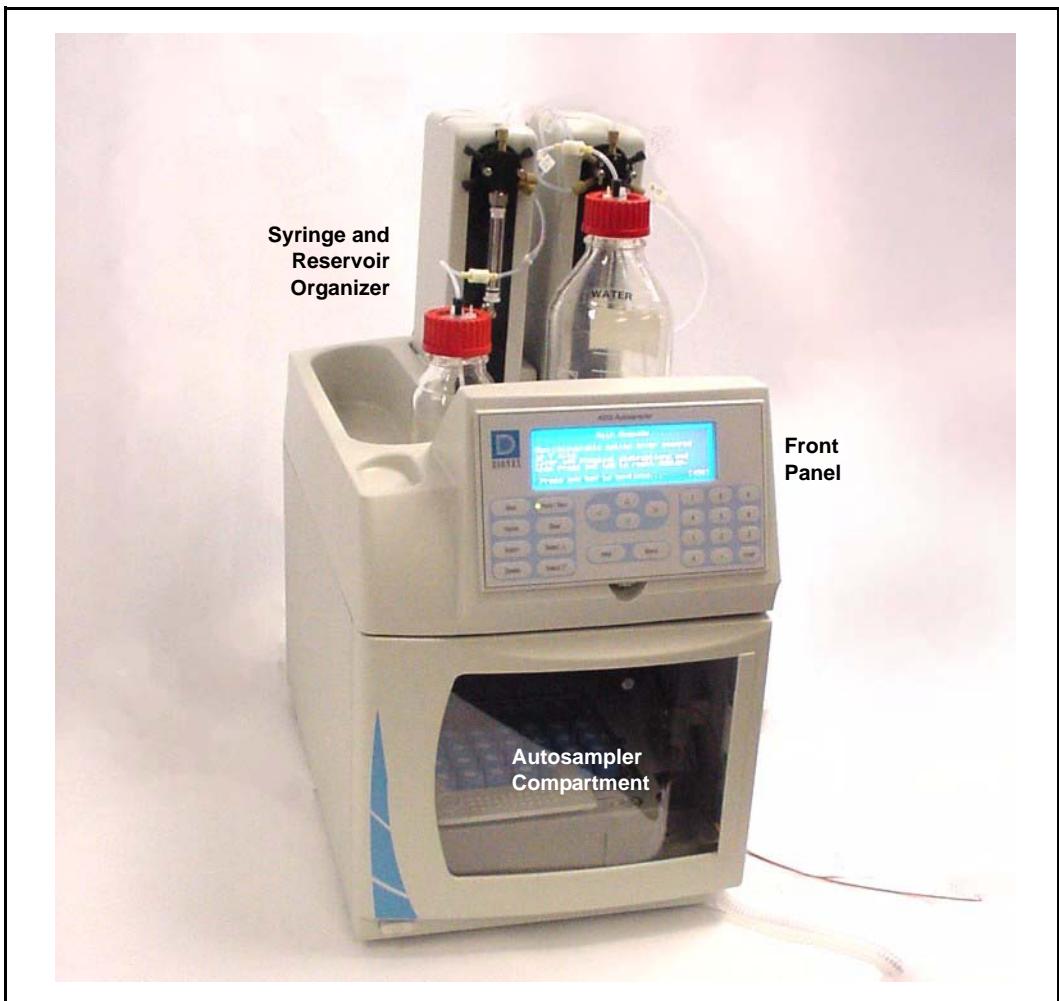
Figure 2-1. AS50 Operating Features

Front Panel

The front panel contains a liquid crystal display (LCD) and membrane keypad (see Section 2.2). The front panel permits manual control of all AS50 functions.

Autosampler Compartment

The autosampler compartment contains a stationary sample vial tray and a sampling needle arm that moves from vial to vial during operation (see Section 2.3).

Syringe and Reservoir Organizer

The organizer on top of the autosampler holds the sample syringe, the flush liquid reservoir, the optional prep syringe, and the optional reagent reservoir(s). See Section 2.3.1 for details.

Options (Not Pictured)

- **Sample Temperature Control:** The optional sample temperature control unit mounts under the autosampler and provides uniform heating and cooling of the vial tray. See Section 2.3.5 for details.

- **Simultaneous Injection:** The simultaneous injection option lets a single AS50 deliver sample to two independent ion chromatography (IC) systems. See Appendix E for details.

- **Injection Valve:** The AS50 connects to an injection valve installed in another chromatography system module. Commands from the AS50 front panel or from Chromeleon are used to control injection valve operation.

  With the simultaneous injection option, the AS50 connects to two injection valves, installed in two ion chromatography system modules or in the AS50 autosampler compartment.

2.2 Front Panel Features
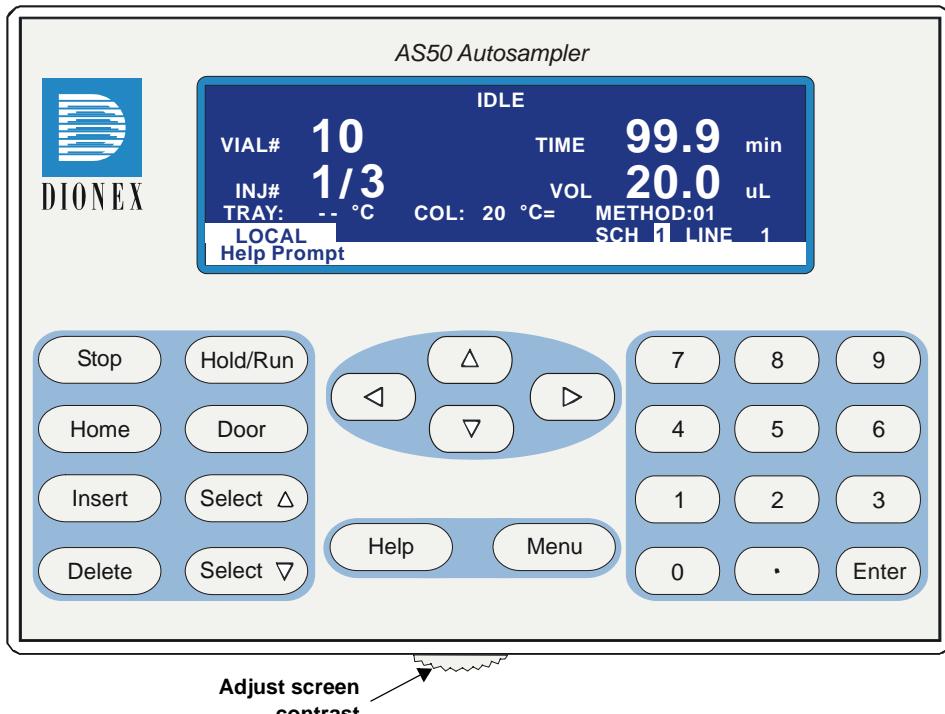
Figure 2-2. AS50 Front Panel

Information is displayed on the LCD, or *screen*. To adjust the screen contrast, use the knurled knob in the recess below the keypad (see Figure 2-2).

From the keypad, you can:

• Directly control AS50 operation

• Create and modify programmed series of operating steps, called *methods*

• Create and modify programmed series of injections, called *schedules*

Refer to Section 2.2.2 for a summary of how to select screens and edit parameters.
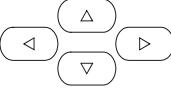
2.2.1   Keypad Button Functions

Button	Function

The following buttons directly control AS50 operation:

Stop

Stops a schedule if the AS50 is in Local mode, Schedule control. A confirmation message appears; press **Stop** again to abort the schedule or **Hold/Run** to resume.

If the AS50 is in Direct Control, pressing **Stop** stops the current syringe and/or sampling arm movement.

Note: Pressing **Stop** while the AS50 is in Direct Control, Locked Remote mode (Chromeleon control) is not recommended. Use the controls on the Chromeleon Control panel to stop a sequence.

Hold/Run
(Hold)

Hold/Run
(Run)

At power-up, the AS50 is on hold (the left LED is illuminated). After you select a schedule to run, pressing **Hold/Run** starts the schedule (the right LED is illuminated). When the schedule is complete, the AS50 returns to hold. When running, press **Hold/Run** to pause the schedule. This button functions only when the AS50 is in Local mode.

Note: If the wait operation is enabled (see Section 2.6.1), the AS50 pauses when it reaches the wait step in the method. Press **Hold/Run** to continue. You can disable the wait (see Section 2.6.4).

Home

Sends the needle arm to its home position. This button functions only when the AS50 is in Local mode. If a schedule is in progress, it must be on hold. If you press **Home** when a schedule is on hold, and then resume the schedule, the needle arm returns to where it was when you pressed **Home**.

Door

When the **Door** button is pressed, a message screen indicates whether it is currently safe to open the door. If it is, a timer counts down the remaining time in which it is safe to open the door. Opening the door without first pressing this button, or when the message indicates it is not safe, aborts the currently running schedule.

The following buttons control screen functions:
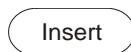
Insert

Inserts a new step into a method or schedule. Move the cursor to the leftmost field on the **SAMPLE PREP**, **TIMED EVENTS**, or **SCHEDULE** screen and press **Insert**. The new step is added above the cursor position.

Button	Function
Delete	**Delete** performs several functions:
	• Cancels an entry that is in progress and restores the previous value.
	• Returns a field to its default value (if an entry is not in progress).
	• Deletes a line in a method or schedule. To do this, position the cursor in the leftmost field of the line that you want to delete and press **Delete** twice.
	• Deletes an entire method or schedule. To do this, position the cursor in the method or schedule edit field, or in the time field of the **INIT** step, and press **Delete** twice.
Select △ Select ▽	The Select buttons cycle through predetermined options in entry fields. To confirm the selected value, press **Enter** or move out of the field by pressing a cursor arrow button. In fields that have predetermined numeric choices, **Select** △ increases the value by one unit and **Select** ▽ decreases the value by one. Holding down a Select button increases (or decreases) the value continuously.
△ ◁ ▷ ▽	The arrow buttons move the cursor in the direction of the arrow to the next entry field (if one exists). At the end of a line, the left arrow wraps the cursor around to the next entry field on the line above; the right arrow wraps the cursor to the next entry field on the line below. The up and down arrows do not wrap around.
	After entering a new value in an entry field, pressing an arrow button saves and/or executes the change.
Help	Displays a help screen specific to the current entry field.
Menu	Displays a list of the available screens.
1	The numeric buttons enter the selected number into the current entry field. From a menu, pressing a numeric button opens the corresponding screen.
Enter	Saves and/or executes changes made in entry fields. If a menu screen is displayed, pressing **Enter** opens the highlighted screen.

2.2.2 Display Screens

The LCD displays status information and allows access to all AS50 operations.

When the power is turned on, the AS50 performs an initialization sequence (see Section 3.1.2) and then displays the **MAIN STATUS** screen. Figure 2-3 is an example of the **MAIN STATUS** screen during AS50 operation.
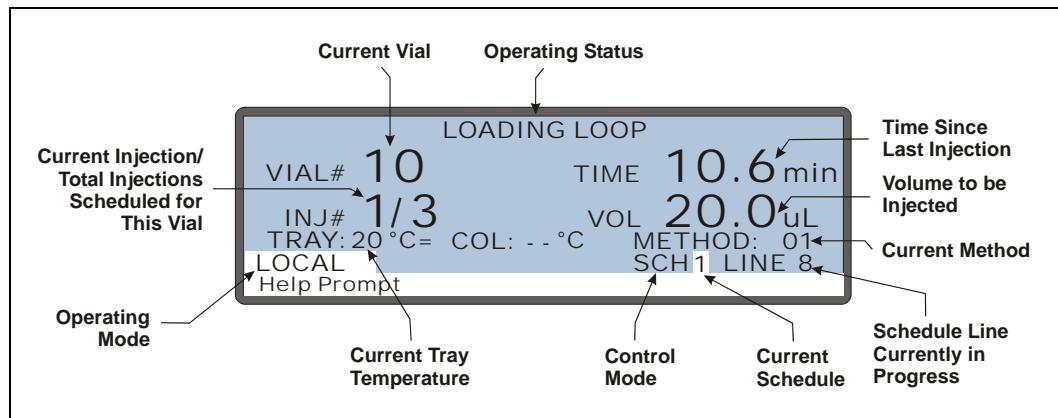
Figure 2-3. Main Status Screen

> **NOTE** **TRAY temperature is displayed only when the sample temperature control option is installed. The column (COL) temperature option is not currently used.**

To access other AS50 screens:

Press the **Menu** button. The **MENU of SCREENS** appears (see Figure 2-4).

MENU of SCREENS	
1 MAIN STATUS	6 FLUSH/PRIME
2 DETAIL STATUS	7 TIME FUNCTION IN
3 METHOD MENU	8 DIAGNOSTIC MENU
4 SCHEDULE	9 PRINT MENU
5 MODULE SETUP MENU	10 TIME FUNCTION OUT
Help Prompt	
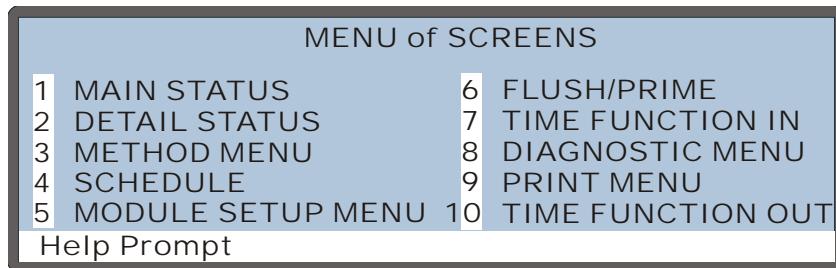
Figure 2-4. Menu of Screens

To select a screen from the menu:

- Press the keypad number button corresponding to the screen's number on the menu, or

- Move the cursor to highlight the screen number and press **Enter**.

To display a brief description of each screen:

Press the **Help** button. See Appendix C for details about each screen.

To edit a field on the screen:

1. Press a cursor arrow button to position the cursor in the field to be edited. Fields on the screen that are in reverse video (blue letters on white background) can be edited. Other fields display information only.

2. If the field accepts numerical values, press the desired numerical buttons to enter the value.

   If the field has predetermined options, press the **Select** Δ or **Select** ∇ button to choose the desired option.

3. To confirm the selected value, press **Enter** or move the cursor out of the field by pressing an arrow button.

2.3   Autosampler Compartment
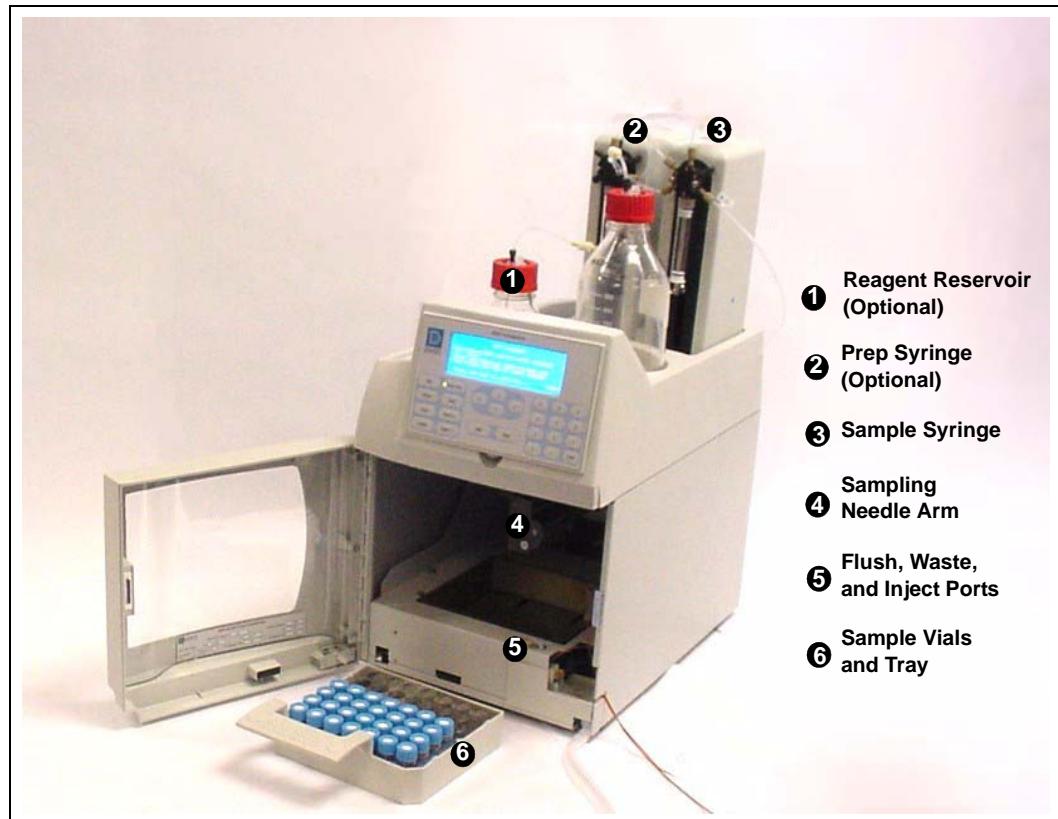
Figure 2-5. Autosampler Compartment Features

2.3.1 Syringe and Reservoir Organizer

The organizer on the top of the autosampler holds the sample syringe, 1 L flush reservoir, and sample preparation option (prep syringe and reagent reservoirs) (see Figure 2-5).

Sample Syringe Functions

The sample syringe performs these operations:

• Pipettes liquid from one vial to another or to waste

• Mixes a vial by repeatedly drawing and expelling the vial contents. If the AS50 is equipped with the sample preparation option, mixing is done with the sample prep syringe instead of the sample syringe.

• Delivers sample to the injection valve

Several sample syringe volumes are available:

Syringe Volume	Part Number
100 µL	055064
250 µL (standard)	053916
500 µL	055065
1000 µL	055066
5 mL (for the simultaneous injection option only)	053915
10 mL (for the simultaneous injection option only)	055068

Sample Preparation Option Functions

The AS50 can be equipped with a sample preparation option that includes a sample prep syringe, a sample prep valve, and one 250 mL reagent reservoir. Additional reagent reservoirs are available.

The sample prep syringe performs these operations:

• Dispenses reagents from external reservoirs to any vial

• Mixes a vial by repeatedly drawing and expelling the vial contents

- Performs dilutions, allowing preparation of multilevel calibration standards

- Performs liquid-liquid extractions by adjusting the height of the needle in the vial

The following sample prep syringe volumes are available:

Syringe Volume	Part Number
2.5 mL	055067
5 mL (standard)	053915
10 mL	055068

The reagent reservoir connects to Port A on the sample prep valve. Additional reservoirs can be connected to ports B, C, and D. Commands from the front panel screens or from Chromeleon let you select the reservoirs.

2.3.2 Sampling Needle Arm

IMPORTANT

The autosampler door must remain closed during operation. If the door is opened during operation, the sampling arm stops immediately. If a schedule is running, it is aborted. To safely open the door during a schedule, press the Door button. See Section 3.8 for details.

During operation, the sampling needle arm moves the sample needle along X-, Y-, and Z-axes. To sample from a vial, the arm moves to the vial's position in the tray and lowers the needle into the vial. The sampling needle pierces the top of the sample vial to allow fluid to be drawn or delivered. When sampling is complete, the arm raises the needle out of the vial. The vial tray is stationary throughout the sampling process. When running a schedule of injections, vials can be sampled in any order.

During a flush operation, the sampling needle arm delivers flush fluid to the flush port (see Figure 2-6).

The needle height (the distance from the tip of the needle to the bottom of the vial) can be adjusted, allowing operations such as liquid-liquid extraction.

2.3.3   Flush, Waste, and Inject Ports

The flush port flushes the outside of the sampling needle with fluid from the flush reservoir. Excess fluid flows to the waste port. The waste port accepts waste fluid from the sampling needle and the flush port, and directs it out the drain line. The inject port (see Figure 2-6) accepts the sample from the sampling needle and delivers it to the injection valve.
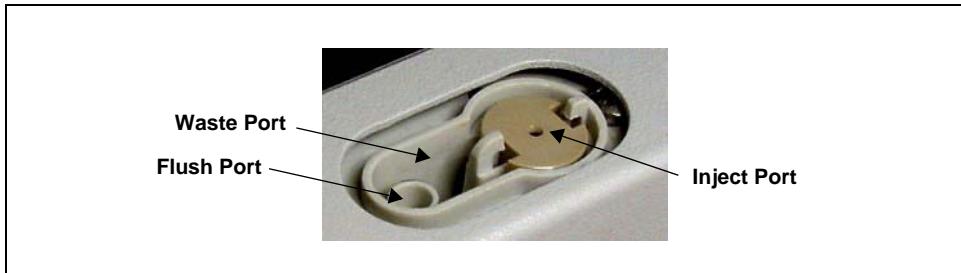
Figure 2-6. Flush, Waste, and Inject Ports

2.3.4   Sample Vials and Trays

Vials

The following vials are available:

- 0.3 mL polymer (P/N 055428, package of 100)

- 1.5 mL glass (P/N 055427, package of 100)

- 10 mL PolyVial™ (P/N 055058, package of 100)

Vial Trays

The following tray types are available:

Tray Material	Vial Size Held	Tray Capacity	Part Number
Plastic	10 mL	49	055056
Aluminum	0.3 mL, 1.5 mL	100	055057
Insulated Aluminum*	0.3 mL, 1.5 mL	100	061407

* For use with the sample temperature control option only.

The AS50 automatically detects the type of tray installed.

IMPORTANT	**Dionex does not recommend using the 10 mL plastic tray with the sample temperature control option because the plastic tray is inefficient at heating and cooling the vials. In addition, the tray is not designed for temperatures above 40 °C (104 °F) and may become deformed over time if used above 40 °C.**

2.3.5   Sample Temperature Control Option

The optional sample temperature control unit provides heating and cooling of the sample vial tray. You can program the temperature set point to between 4 °C and 60 °C. Vials in the tray are uniformly heated or cooled to the programmed set point (to a minimum of 20 °C below ambient and a maximum of 40 °C above ambient).

The sample temperature control unit sits on the workbench below the autosampler compartment (see Figure 2-7).

Figure 2-7. AS50 with Sample Temperature Control

2.3.6 Simultaneous Injection Option

The AS50 simultaneous injection feature lets a single AS50 deliver sample to two independent IC (ion chromatography) systems. The two IC systems are plumbed in parallel and connected to two injection valves installed either in the AS50 autosampler compartment or in the IC system modules. Dual analyses can be performed with only one sample, thus increasing sample throughput and eliminating the need to label, fill, and track two sample vials.

The simultaneous injection option requires a 5 mL or 10 mL sample syringe. Full-loop injections are required with this option.

See Appendix E for detailed simultaneous injection setup and operation instructions.

2.4   Rear Panel Features

Thermal or
Chromatography
Compartment
Cable Connector
(not used)

RS-232
Printer
Connector

USB
Receptacle

TTL/Relay
Connectors

Syringe
Connectors

Main Power
Receptacle and
Fuse Holder

Auxiliary
Power
Connector
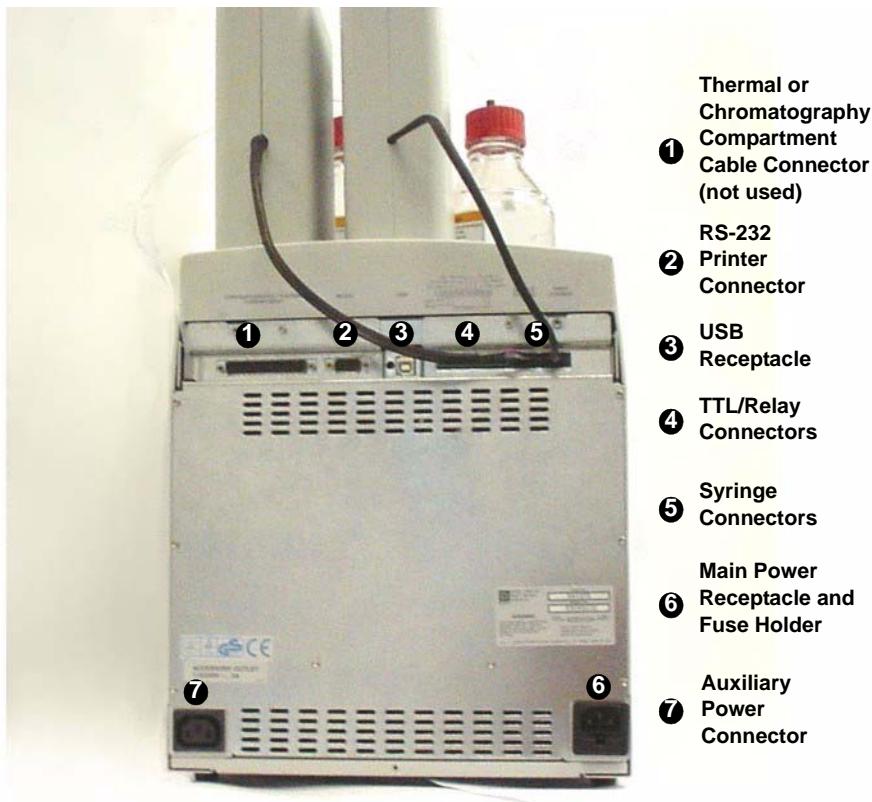
Figure 2-8. AS50 Rear Panel

2.4.1   RS-232 Connector

The RS-232 connector allows a serial printer to be connected to the AS50
for printing of schedules, methods, setup and configuration information,
or the message log.

2.4.2 **USB Receptacle**

The USB receptacle provides a connection to the Chromeleon computer. To enable computer control of the autosampler, connect a USB cable between the USB receptacle on the AS50 rear panel and a USB port on the computer or USB hub. See Section B.3.5 for USB connection instructions.

2.4.3 **TTL/Relay Connectors**

The eight relay and TTL connectors interface with Dionex and non-Dionex modules. The input connectors allow for relay and TTL control of the autosampler by a connected module(s). The output connectors allow the AS50 to control other module(s). Appendix D describes the relay and TTL functions and the connections between the AS50 and other modules.

2.5 Operating and Control Modes

The operating mode determines *how* the AS50 receives operating commands:

- In Local mode, the AS50 receives commands from the front panel buttons and screens. When the AS50 is powered up, it is always in Local mode. In Local mode, all AS50 operating functions are available.

- In Locked Remote mode, Chromeleon software sends commands from the host computer via the USB interface. Connecting the AS50 to a Chromeleon Control panel immediately selects the Locked Remote mode. Disconnecting from Chromeleon returns the AS50 to Local mode.

The control mode determines *when* operating commands are executed:

- In Direct control, the AS50 executes commands immediately.

- In Schedule control, the AS50 executes commands by running a programmed schedule of injections. Schedule control is used in Local mode only.

The table below summarizes the AS50 operating and control mode configurations.

Operating/Control Mode	Autosampler Operation
Locked Remote/Direct Control	Commands are sent from Chromeleon and executed immediately when received.
Local/Direct Control	Commands are entered from the AS50 front panel and executed immediately after being entered.
Local/Schedule Control	Commands are entered from the AS50 front panel and executed by running a schedule programmed from the front panel.

TTL input signals from a remote controller, such as an integrator, can also be used to control the AS50. The AS50 accepts TTL signals when it is in Local or Locked Remote mode. The following functions can be controlled via TTL input signals.

- Start a schedule or continue a schedule that is waiting for a run command

- Turn the optional tray temperature control on and off

- Turn the optional column temperature control on and off. **Note:** this option is currently not available for the AS50 (USB).

See Appendix D for details about TTL control.

2.5.1 Local/Direct Control Mode

You can directly control the following AS50 functions from the front panel:

- TTL and relay outputs

- Injection valve position

- Injection valve 2 position (if installed)

- Tray set point (if installed)

Set the above functions from the **DETAIL STATUS** screen (see Figure 2-9).

```
DETAIL                IDLE
   VIAL#:          TIME:     min      TTL1  1
    INJ#:          VOL:      uL       TTL2  0
METHOD:            TRAY:  2  mL       RLY1  0
   TRAY: 25  20 °C↑ LOOP: 100   uL    RLY2  0
    COL: --    -- °C                  INJ VLV  L
  LOCAL          DIRECT CONTROL       CS VLV  A
 Help Prompt
```
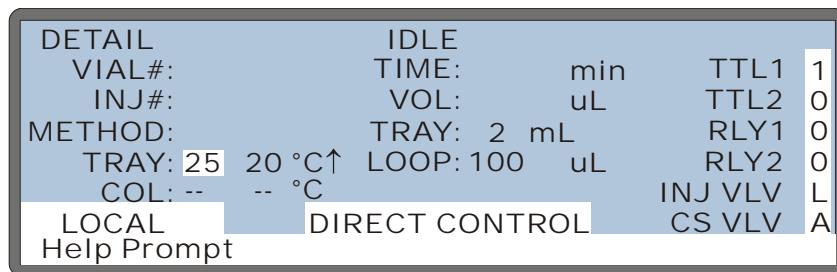
Figure 2-9.   Detail Status Screen Example

NOTE **The CS VLV field sets the position of a column switching valve. This valve option is used in chromatography and thermal compartments, which are not available currently for the AS50 (USB).**

2.5.2 Local/Schedule Control Mode

The AS50 runs all injections according to a programmed schedule. The schedule defines a series of vials to be sampled and the operating parameters to run on each vial. A schedule consists of the following parameters:

- The vials to sample

- The number of injections to draw from each vial

- The volume of each injection

- The method to run on each injection

- The action to take when a scheduled vial is missing

You program, save, and edit schedules from the **SCHEDULE** screen (see Figure 2-10). The AS50 can store up to nine schedules in memory. The stored schedules are retained in memory when the AS50 is turned off. Section 3.11 describes how to create schedules.

```
SCHEDULE        EDIT         SAVE TO          RUN
MISSING VIAL ACTION:      STOP
                VIAL#        INJ/       INJ
LINE       START- END       VIAL     VOL(uL)      METHOD
 1          1  -  1          1        25.0           1


Help Prompt
```
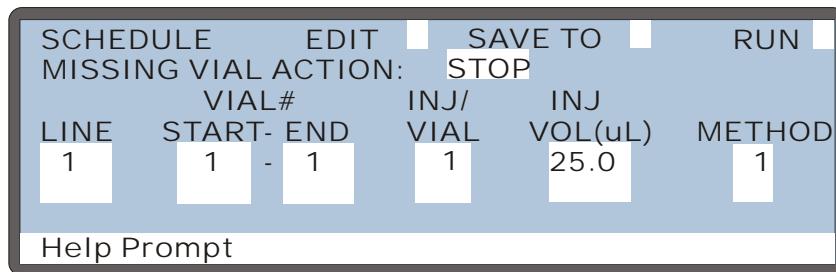
Figure 2-10. Schedule Screen

Each injection in a schedule is assigned a *method* (a series of operating instructions that tells the AS50 how to perform a single injection). A method consists of the following three phases:

Method Phase	Used To	Examples
Sample prep	Prepare the sample for injection	Pipetting, mixing, diluting
Method setup	Set parameters that remain constant throughout the method	Sample needle height, column temperature
Timed events	Perform functions at a specific time in the method	Loading the sample loop, injecting

When the method runs, the AS50 performs the sample prep steps first, followed by the method setup, and then the timed events steps. Section 3.10 describes how to create methods.

2.5.3 Locked Remote/Direct Control Mode (Chromeleon Control)

Connecting the AS50 to a Chromeleon Control panel immediately selects the Locked Remote/Direct Control mode. In this mode, you cannot change any operating parameters from the front panel keyboard. To return the AS50 to Local mode, disconnect the AS50 from the Chromeleon Control panel, or turn off the AS50 power.

Two modes of software control are available:

• With direct control, you select operating parameters and commands from the Chromeleon menu bar, toolbars, and Control panels.

• With automated control, you create a list of samples (a sequence) to be processed automatically. The sequence includes programs with commands and parameters for controlling the AS50, acquiring sample data, and producing reports.

Control Panels

NOTE **This section provides a brief overview of how to open and connect to a Chromeleon Control panel. For details, refer to the Chromeleon Help or user's manual. For instructions on how to configure the AS50 in Chromeleon, see <u>Section B.3.9</u>.**

Chromeleon provides two types of Control panels for the AS50.

• System Control panels are used for controlling and monitoring AS50 operation. System Control panels are described below.

• The Wellness panel is used to test and calibrate the leak sensor and diagnostic functions. The Wellness panel is described in **<u>Section 5.15</u>**.

System Control panels are used for controlling and monitoring system operation, including AS50 operation. Control panels are located in the **Dionex Templates/Panels/Dionex_IC** folder in the Chromeleon Browser. Chromeleon provides panels for various IC system configurations.

To open a Control panel, expand the folder for the type of system to which the AS50 is connected (for example **.../Dionex_IC/ICS-2000 System Panels**) and double-click a panel that includes an AS50. For

example, double-clicking **ICS-2000_System_AS50.pan**, opens the
Control panel shown in <u>Figure 2-11</u>. After opening the Control panel,
connect it to the timebase in which the AS50 is configured (select
Control>Connnect to Timebase).
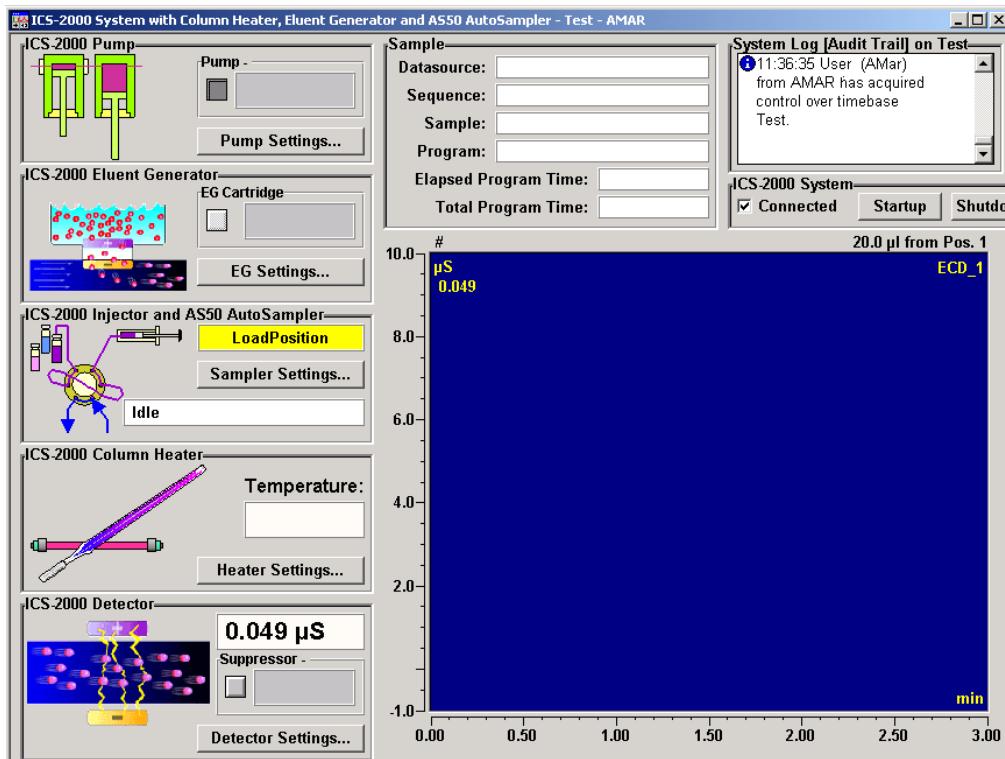
Figure 2-11. Example Chromeleon System Control Panel

To control AS50 operation, click the **Sampler Settings** button to open the
Injector Settings window. This window lets you select various AS50
operating parameters, including the vial to be sampled, the injection

volume, and the position of the injection valve. You can also initiate a flush or prime operation from this window.
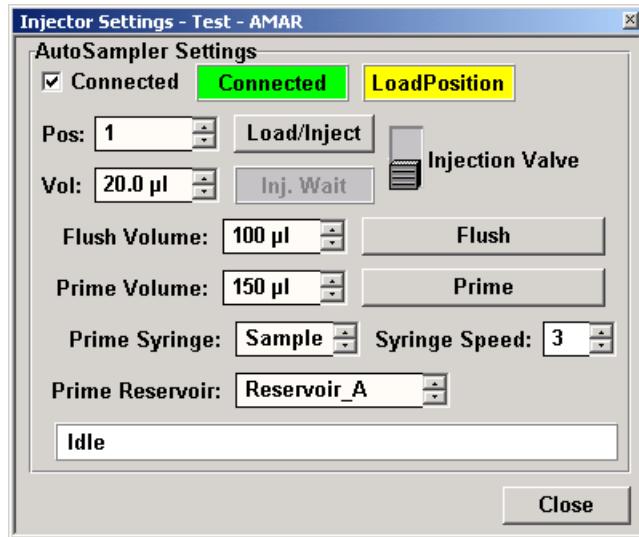
Figure 2-12. Example Chromeleon System Control Panel:
Injector Settings Window

2.6   Theory of Operation

2.6.1   Understanding the Wait Operation

> **NOTE** **This section pertains to AS50 operation in Local/ Schedule Control mode only.**

The wait operation is a step in the sample prep phase of a method. After performing all other sample prep steps, the AS50 waits for a continue command before performing the method's timed events. The continue command can be from either the front panel **Hold/Run** button or a TTL input signal.

The wait's position in the sample prep steps determines whether samples are run overlapped or sequentially:

- When the wait is the last step in the sample prep phase (the default), samples are overlapped (see <u>Section 2.6.2</u>).

- When the wait is at the beginning of the sample prep phase, samples are run sequentially (see <u>Section 2.6.3</u>).

> **NOTE** **The   wait   operation   can   be   disabled   (see <u>Section 2.6.4</u>).**

2.6.2   Overlapping Sample Preparation

When the wait is at the end of the sample prep phase (the default), the AS50 overlaps sample preparation. This means that while data collection is occurring for one injection, the AS50 performs the sample prep steps for the next injection (see Figure 2-13). For a detailed description of the schedule run flow of operations, see Section 2.6.6.
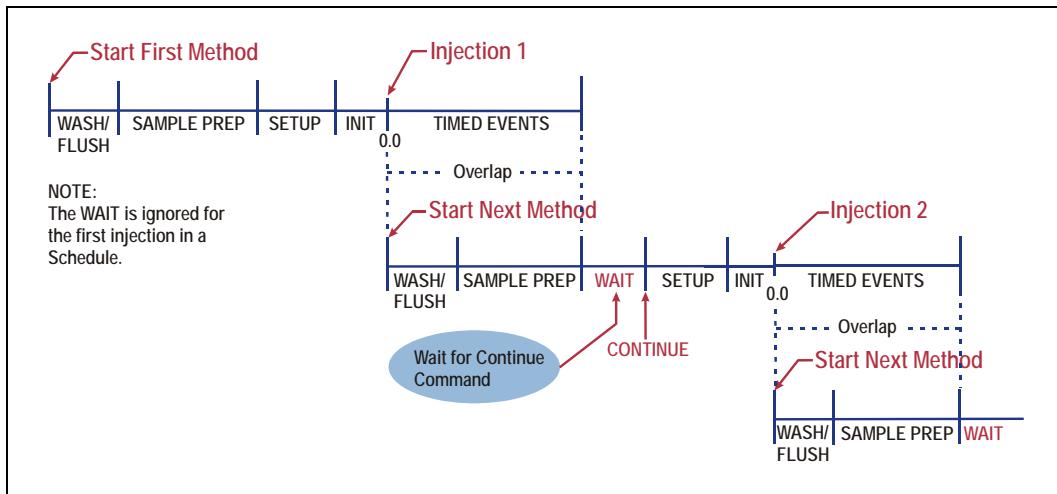
Figure 2-13.   Sample Prep Overlap: Wait Operation at End of Sample Prep Phase (Default)

NOTE **If Chromeleon is controlling the AS50, front panel settings for the wait operation are ignored. Instead, an option in the AS50 Properties dialog box in the Server Configuration program determines whether samples are overlapped. Sample overlap is enabled by default in Chromeleon. For instructions on how to configure the AS50 in Chromeleon, see Section B.3.9.**

2.6.3 Running Samples Sequentially

Placing the wait at the start of the sample prep steps allows samples to be run sequentially. The AS50 completes the sample prep and timed events for an injection before starting the next (see Figure 2-14).
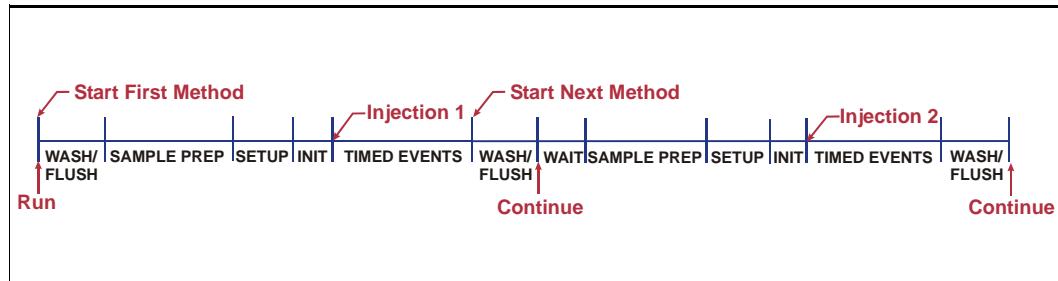
Figure 2-14. No Sample Prep Overlap: Wait Operation at Beginning of Sample Prep Phase

2.6.4 Using the AS50 as the System Master (Disabling the Wait Operation)

When the wait operation is disabled, a single run command (for example, pressing the **Hold/Run** button) starts the schedule. Thereafter, the AS50 performs the schedule lines without requiring additional commands. This allows the AS50 to act as the *system master* (the AS50 controls the system by sending TTL signals to start the pump and detector methods).

To disable the wait operation, press **Menu** and **5** to go to the **MODULE SETUP MENU** and press **5** to go to the **SYSTEM PARAMETERS** screen. Set the **WAIT** field to **DISABLED** (see Figure 2-15).

```
                 SYSTEM PARAMETERS

                WAIT:   DISABLED
       SYRINGE SPEED:   5
 CUT SEGMENT VOLUME:      0    uL
  INJECT PORT VOLUME:    25    uL
 SRS POWER SWITCHING:   DISABLED
 Help Prompt
```
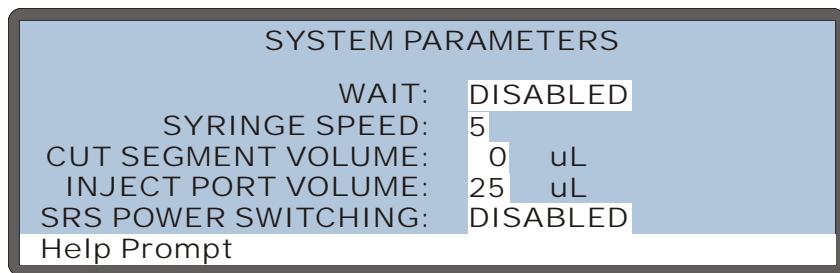
Figure 2-15. System Parameters Screen

For details about the order of events during a schedule when the wait is disabled, see Figure 2-18.

2.6.5   Understanding the Cycle Time

Cycle time is an optional feature that can be used to control the time between injections. When a method is assigned a cycle time, the AS50 delays sample injection until the specified time has elapsed since the previous injection. Cycle time is measured from the start of the previous method's timed events (see Figure 2-16). Assuming injection occurs at time zero for each method (the default), specifying a cycle time allows a consistent time interval between injections, regardless of differences in sample prep and timed events among methods.
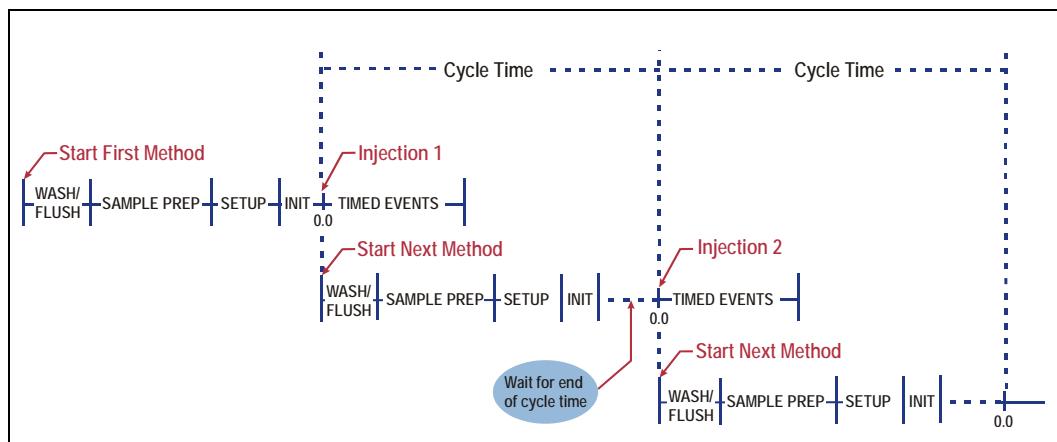
Figure 2-16.   Cycle Time Example

A cycle's duration is never shorter than the specified time. However, cycle time will be ignored, thus delaying injection, if any of the following events occurs:

- **WAIT FOR TEMP STABLE** is enabled and the column temperature did not stabilize by the end of the cycle time.

- The sample prep wait operation is enabled and a run command did not occur by the end of the cycle time.

- The previous method's timed events extend beyond the cycle time.

If the cycle time expires before the injection occurs, a warning message is displayed and the message is logged on the **MESSAGE LOG** screen (see Section C.9.6).

2.6.6 Operating Events During a Schedule

- Figure 2-17 shows the order of events during a schedule when the wait operation is enabled.

- Figure 2-18 shows the order of events during a schedule when the wait operation is disabled.

See Section 2.6.1 for details about the wait operation.
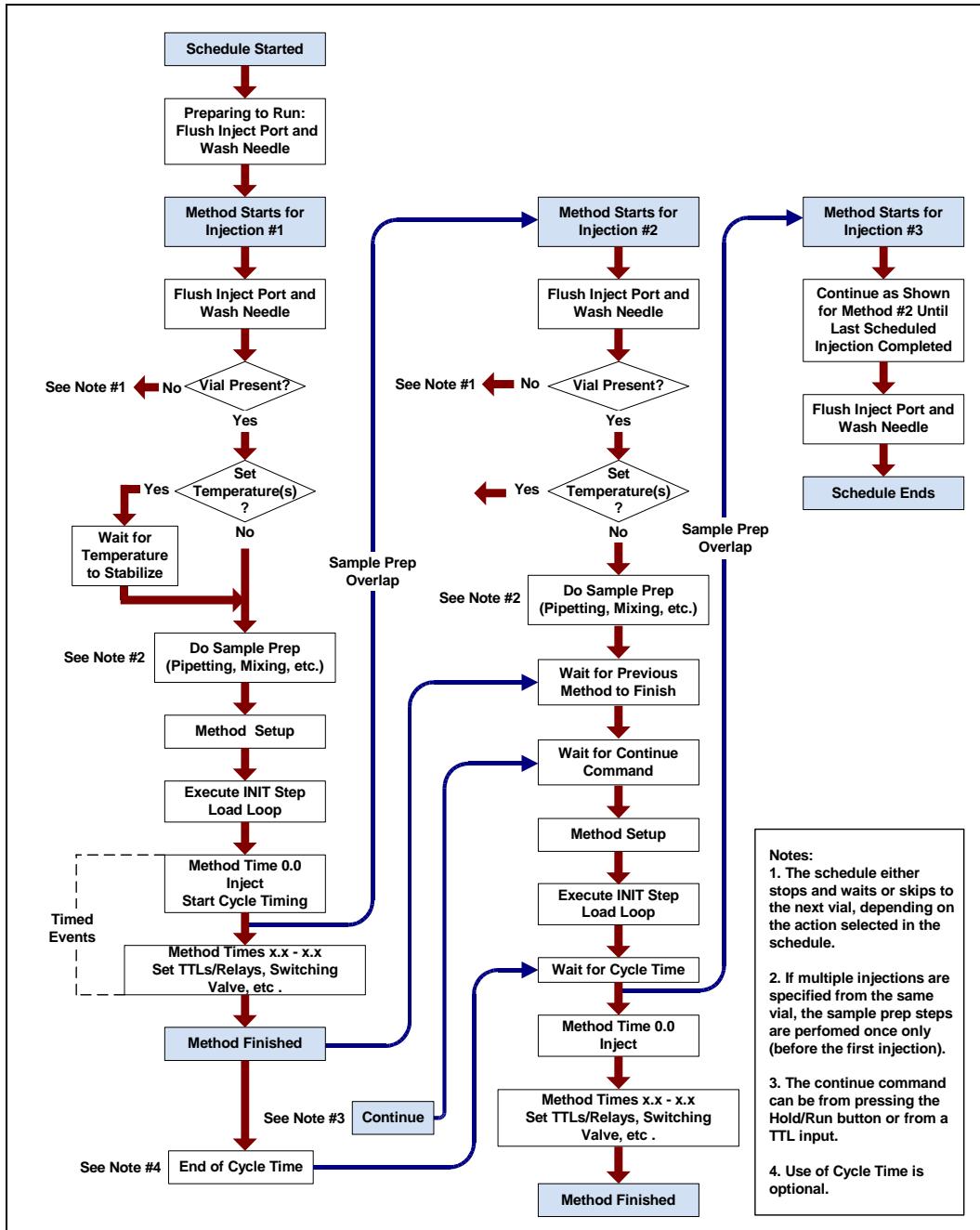
Figure 2-17. Order of Events During a Schedule Run (Wait Enabled)

Schedule Started

Preparing to Run:
Flush Inject Port
and Wash Needle

Method Starts for Injection #1

Flush Inject Port and Wash Needle

See Note #1 ← No — Vial Present? — Yes

Set Temperature(s)?

Yes → Wait for Temperature to Stabilize

No

See Note #2 — Do Sample Prep (Pipetting, Mixing, etc.)

Set Up Method

Execute INIT Step Load Loop

Method Time 0.0 Inject Start Cycle Timing

Timed Events

Method Times x.x - x.x Set TTLs/Relays, etc.

Method Finished

See Note #3 — End of Cycle Time

Sample Prep Overlap

Yes

Method Starts for Injection #2

Flush Inject Port and Wash Needle

See Note #1 ← No — Vial Present? — Yes

Set Temperature(s)?

Yes ←

No

See Note #2 — Do Sample Prep (Pipetting, Mixing, etc.)

Wait for Previous Method to Finish

Setup Method

Execute INIT Step Load Loop

Wait for Cycle Time

Method Time 0.0 Inject

Method Times x.x - x.x Set TTLs/Relays, etc.

Method Finished

Sample Prep Overlap

Method Starts for Injection #3

Continue as Shown for Method #2 Until Last Scheduled Injection Completed

Flush Inject Port and Wash Needle

Schedule Ends

Notes:
1. The schedule either stops and waits or skips to the next vial, depending on the action selected in the schedule.

2. If multiple injections are specified from the same vial, the sample prep steps are perfomed once only (before the first injection).

3. Use of Cycle Time is optional.

Figure 2-18. Order of Events During a Schedule Run (Wait Disabled)

2.6.7   Operating Events During Flushing and Priming

The AS50 automatically flushes the inject port and washes the outside of the needle at the beginning and end of a schedule, as well as before each injection, while the schedule is running. Flushing can also be performed manually when the AS50 is idle, or as a step in the sample prep phase of a method.

Priming of the flush and reagent lines is done manually after refilling a reservoir, or after the AS50 has been idle for a period of time.

Flushing

The AS50 performs the following operations during flushing:

*   The sampling needle arm moves to the waste port and expels any fluid from the needle.

*   The needle arm then moves to the inject port and delivers a volume of fluid for flushing the inject port. If the injection valve is set to the Load position, the sample loop is also flushed.

*   The needle arm moves to the flush port and delivers a volume of flush fluid. This washes the outside of the needle.

The flush reservoir and sample syringe are always used to perform the flush.

The needle is washed with a factory-set volume. Select the volume of liquid to flush through the inject port on the **FLUSH/PRIME** screen (see Section C.7). If you specify a flush volume that is greater than the sample syringe volume, the AS50 performs multiple syringe strokes until the volume is reached.

Priming

The AS50 performs the following operations during priming:

• The sampling needle arm moves to the waste port and expels any fluid from the needle.

• The needle arm then delivers a volume of fluid to the flush port. This primes the lines from the flush reservoir to the syringe and through the sample transfer line to the sampling needle (see Figure 2-19).

When the sample preparation option is installed, additional priming is required to prime the lines from the reagent reservoir(s) to the sample syringe (see Figure 2-20). See Section B.3.10 for details.
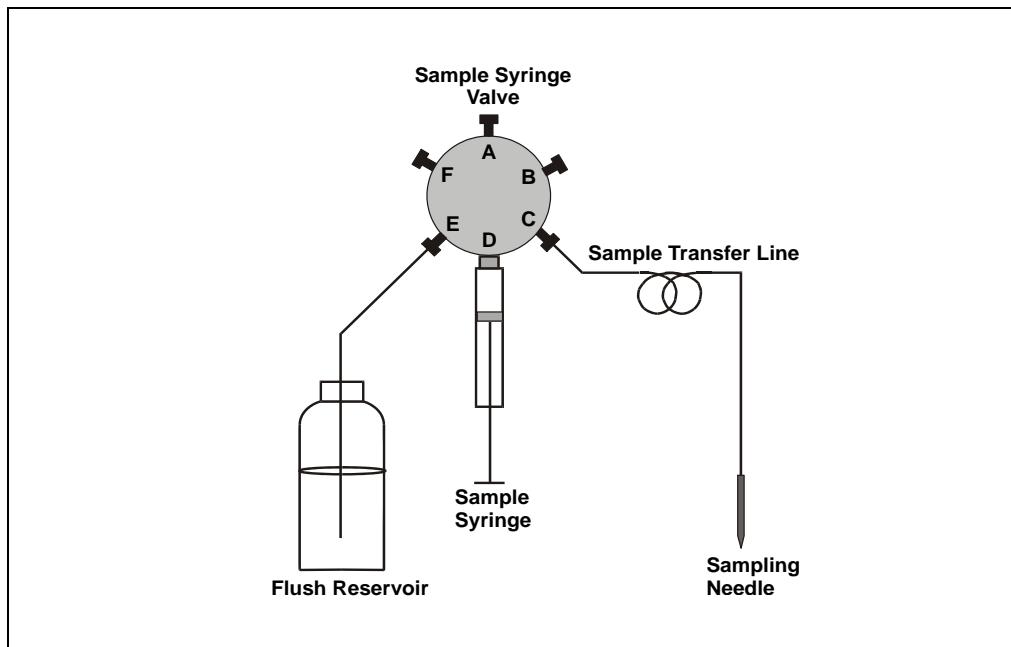
Figure 2-19. Fluid Schematic for Sample Syringe
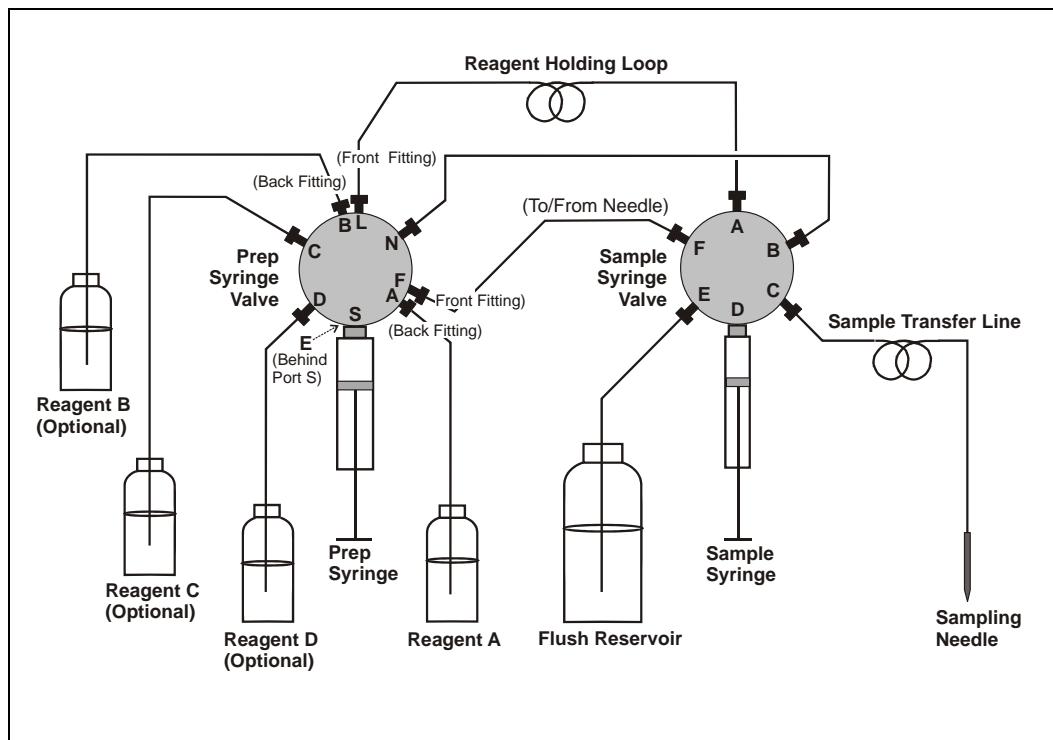
Figure 2-20. Fluid Schematic for Sample Syringe with Optional Prep Syringe

2.6.8 Understanding the Status Display During a Run

During runs, the **MAIN STATUS** and **DETAIL STATUS** screens display the operation(s) currently being performed. Because of sample prep overlap, information on multiple injections may be displayed simultaneously at certain points in the schedule. For example, in <u>Figure 2-21</u>, the AS50 is injecting the sample and performing the timed events for the first injection from vial 1 while preparing for the second injection.

Method Timed Events Clock for Injection #1 **Preparing for Injection #2** **Elapsed Time Since Injection #1**

```
DETAIL              FLUSHING
  VIAL#:  1           TIME: 12.5  min      TTL1  0
   INJ#:  1/3          VOL: 25     uL      TTL2  1
METHOD:1    12.53    TRAY:  2  mL          RLY1  0
    TRAY: 25  20 °C↑ LOOP: 100    uL       RLY2  0
     COL: --    -- °C  PARTIAL            INJ VLV  L
   LOCAL              SCH 1   LINE 10      CS VLV  A
 Help Prompt
```
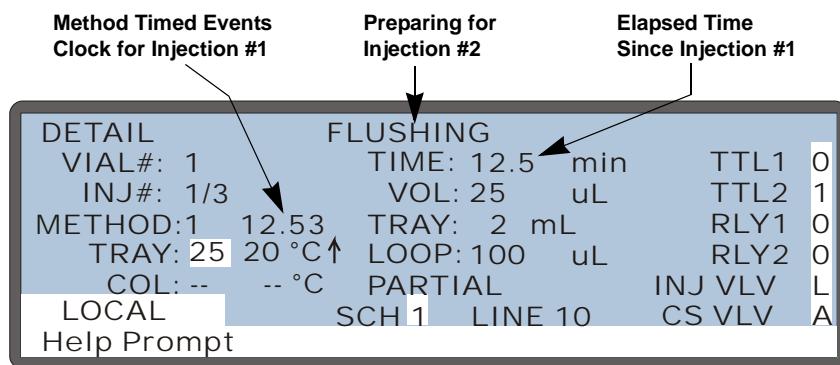
Figure 2-21. Detail Status Screen Example

Notes

- The **INJ#** field is updated when the AS50 loads the loop for the next injection.

- The **TIME** field and the **METHOD** timed events clock are reset to zero at injection.

- The **TIME** field counts up from the injection until the next injection occurs.

- The **METHOD** timed events clock counts up until all timed events have been performed for an injection. The clock then stops and is no longer displayed.

3 • Operation and Maintenance

3.1 Getting Ready to Run

The AutoSelect AS50 Autosampler is designed for use with IC (ion chromatography) and BioLC® (biocompatible liquid chromatography) applications and should not be used for any other purpose. Operation of the AS50 in a manner not specified by Dionex may result in personal injury.

If you have a question regarding appropriate usage, contact Dionex before proceeding. In the U.S., call 1-800-346-6390 and select the Technical Support option. Outside the U.S., call the nearest Dionex office.

3.1.1 Fill the Vials and Load the Sample Tray

1. Fill the vials to the vial shoulder or lower (see Figure 3-1). **Do not fill to the top**.

   During sampling, make sure the needle's vent is not immersed in liquid.

   For 10 mL vials only: If necessary, raise the needle height inside the vial to position the vent above the liquid (see "Controlling the Needle's Position in the Vial" on page 3-27).
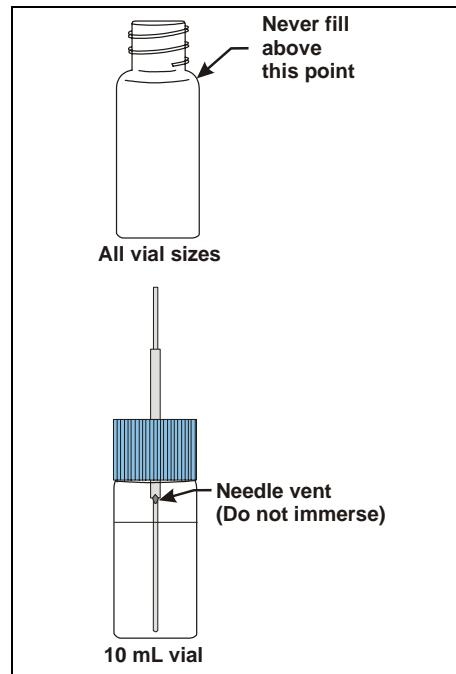
Figure 3-1. Maximum Level to Fill Vials

2. Screw a cap onto each vial and tighten. To prevent septa from falling into the vials when they are pierced by the sampling needle, make sure the cap septas are pushed fully into the caps and the caps are securely tightened.

   NOTE If the sample temperature control option is installed, Dionex recommends using vial caps with slit septa only (P/N 055427; package of 100, 1.5 mL glass vials, caps, and slit septa).

3. Load the vials in the tray in the order required for the schedule (if running under Local control) or sequence (if running under Chromeleon control). See Section 3.11 for instructions on how to create a schedule of injections for Local control.

4. If the sample temperature control option is installed, position tray covers (P/N 061010) over any empty positions on the tray (see Figure 3-2). This ensures temperature stability and minimizes condensation, especially at low temperature set points.
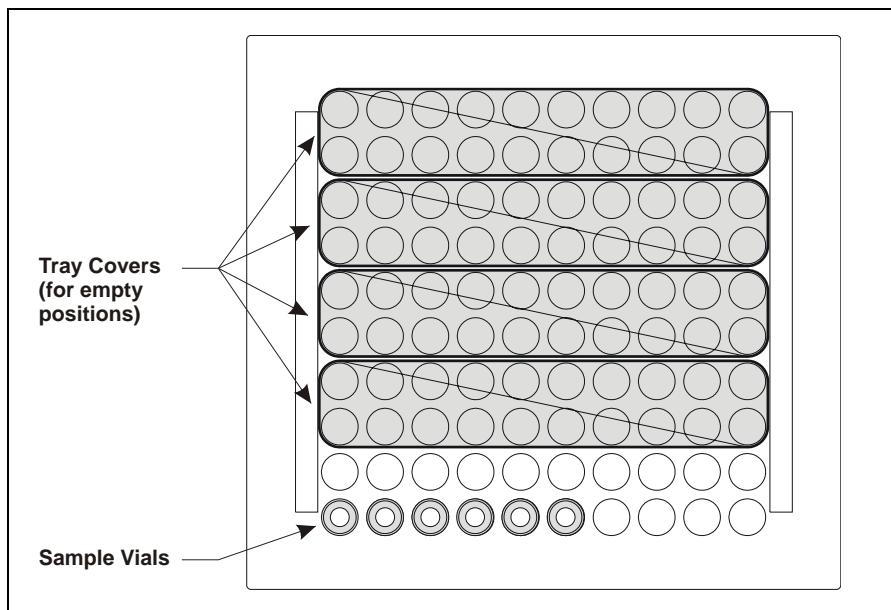
Figure 3-2. Installing Tray Covers (Sample Temperature Control Option Only)

5. Install the tray in the autosampler compartment.

6. Close the autosampler compartment door. Make sure the door remains closed during operation.

IMPORTANT **If the door is opened during operation, the sampling arm stops immediately. If a schedule is running, it is aborted. To safely open the door during operation, press the Door button (see <u>Section 3.8</u> for details).**

3.1.2   Turn On the Power

Press the power switch in the lower left corner of the front door to turn on the AS50 power. When the power is turned on, a series of screens are displayed and the autosampler performs a power-up sequence.

*   The **COPYRIGHT NOTICE** screen is displayed briefly, and then the **POWER-UP** screen appears.

*   While the **POWER-UP** screen is displayed, the AS50 performs initialization procedures and a series of diagnostic tests. If one of the tests fails, testing stops and the **DIAGNOSTIC TEST** screen is displayed. See <u>Section C.9.2</u> if this occurs.

*   When the initialization procedures are complete and the AS50 has passed the diagnostics, the **INSTALLED OPTIONS** screen appears. After a few seconds (or if you press a button), the **MAIN** screen is displayed. The power-up sequence is then complete.

After power-up, you can display the **POWER-UP**, **DIAGNOSTIC TEST**, and **INSTALLED OPTIONS** screens by selecting on the **MENU of SCREENS**. See Appendix C.

3.2   Overview of AS50 Screens

Figure 3-3 shows the screens that are available for operating the autosampler. Refer to Appendix C for details about each screen.
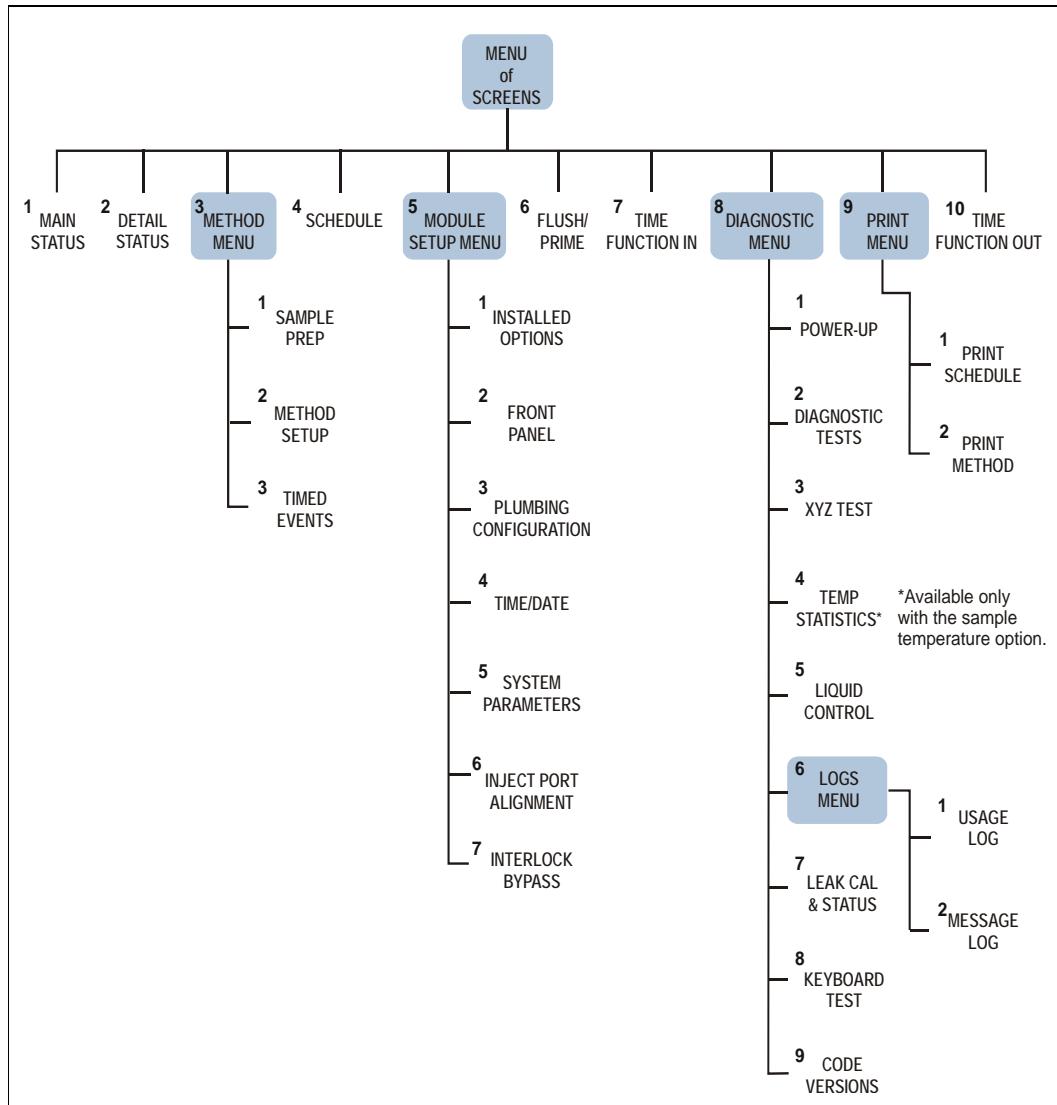
Figure 3-3. AS50 Menu Structure

> **NOTE If the simultaneous injection mode is enabled, several screens change to allow control of two injection valves. Refer to Appendix E for details.**

To access AS50 screens:

- Press the **Menu** button to display a menu of screens.

- To select a screen from the menu, press the keypad number button corresponding to the screen's number on the menu, or move the cursor to highlight the screen number and press **Enter**.

    Example:

    To go to the **SYSTEM PARAMETERS** screen from the **MAIN STATUS** screen:

    1. Press the **Menu** button to display the **MENU of SCREENS**.

    2. Press **5** to go to the **MODULE SETUP MENU.**

    3. Press **5** again to go to the **SYSTEM PARAMETERS** screen.

    To return to the **MAIN STATUS** screen:

    1. Press **Menu** twice.

    2. Press **Enter** or **1**.

To enter or change a value in a screen field:

> **NOTE You can enter or change screen field values only when the AS50 is in Local mode (see <u>Section 3.4</u>).**

1. Press a cursor arrow button to position the cursor in the field.

2. Enter the desired value, using the following buttons.

    - To select from a list of predetermined options, press **Select** Δ or **Select** ∇; repeat to cycle through the choices.

    - To enter a numeric value, press the numeric buttons.

    - To cancel an entry that is in progress and restore the previous value, press **Delete**.

    - To return a field to its default value (if an entry is not in progress), press **Delete**.

3. **IMPORTANT:** Press **Enter** or a cursor arrow button to confirm the entry.

3.3   Default Operating Parameters

The following table lists the factory-set values for AS50 operating parameters:

Operating Screen	Parameter	Default Value
Method Sample Prep	Step	1 Wait step only
Method Setup	Cycle Time	Off
	Sample Needle Height	2 mm
	Column Temperature	Off
	Wait for Temp Stable	No
Method Timed Events	Time=Init	
	Inject Valve	Load (for simultaneous injection, both valves at Load position)
	CSV	A (CSV option not currently available)
	TTL/Relays	All off (0)
	Time=0.00	
	Inject Valve	Inject (for simultaneous injection, both valves at Inject position)
	CSV	A (CSV option not currently available)
	TTL/Relays	All off (0)
Schedule	Missing Vial Action	Stop
	Vial # Start/End	1/1
	Injections per Vial	1
	Injection Volume	25.0 μL; 1 mL for simultaneous injection
	Method Number	1
System Parameters	Wait	Enabled
	Syringe Speed	3
	Cut Segment Volume	10 μL
	Inject Port Volume	varies (each inject port is individually calibrated)
	Air Bubble Volume	8 μL; 60 μL for simultaneous injection (cannot be changed by user)
Flush/Prime	Flush Volume	250 μL
	Flush Reservoir	Flush (always)
	Flush Syringe	Sample (always)
	Prime Volume	400 μL
	Prime Reservoir	Flush
	Prime Syringe	Sample

3.4 Selecting Computer or Front Panel (Local) Control

When the AS50 is powered up, it is always in front panel (Local) control. To select computer control, start Chromeleon and open the Control panel for the timebase to which the AS50 is assigned. Connect the AS50 timebase to the Control panel.

When the AS50 is under computer control, the front panel **MAIN** and **DETAIL** screens indicate this by displaying **LOCKED RMT** and **DIRECT CONTROL** in the operating and control mode fields. See the example in Figure 3-4.
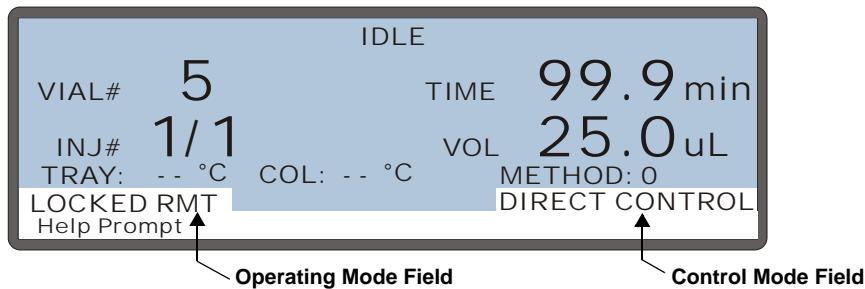
Figure 3-4. Main Screen—Computer Control

To return the AS50 to Local mode, disconnect the AS50 from the Chromeleon Control panel (clear the **Connected** check box). The operating mode field on the **MAIN** and **DETAIL** screens now displays **LOCAL**. See the example in Figure 3-5.
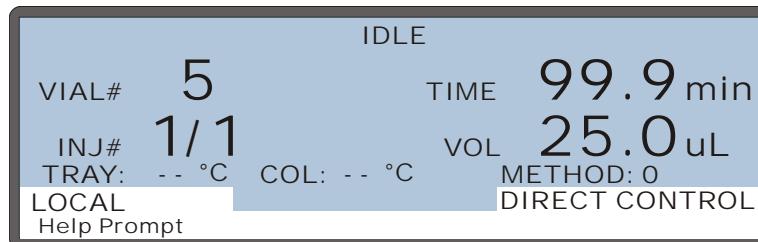
Figure 3-5. Main Screen—Local Control

3.5   Running a Schedule of Injections from the Front Panel

This section describes how to run a schedule of injections from the AS50 front panel. To run a schedule (sequence) of injections from the computer, refer to the Chromeleon Help or user's guide.

Before you can run a schedule, you must first create a method and schedule. See Section 3.10 for details about creating methods and Section 3.11 for details about creating schedules.

Notes

- The AS50 can run a schedule while you are entering or editing any method or schedule, even the one that is currently running.

- Changes made to the currently running method or schedule will be implemented on the next injection.

- When saving changes to the currently running method or schedule, or switching to a different schedule, the clock continues running unaffected. Only those parameter changes which affect the schedule after the current time will be implemented in the current run.

- The AS50 can store up to nine (1 through 9) schedules in memory.

- Methods and schedules are retained in memory even after the AS50 power is turned off.

3.5.1   Selecting and Starting the Schedule

1. Go to the **MAIN STATUS** or **DETAIL STATUS** screen.

2. Position the cursor in the control mode field and press **Select** Δ or **Select** ∇ to toggle to **SCH** (schedule) control (see Figure 3-6).

```
                          IDLE

VIAL#                          TIME              min

  INJ#        /              VOL               uL
TRAY:   - - °C    COL: - - °C      METHOD:
   LOCAL                        SCH  1  LINE
Help Prompt
```
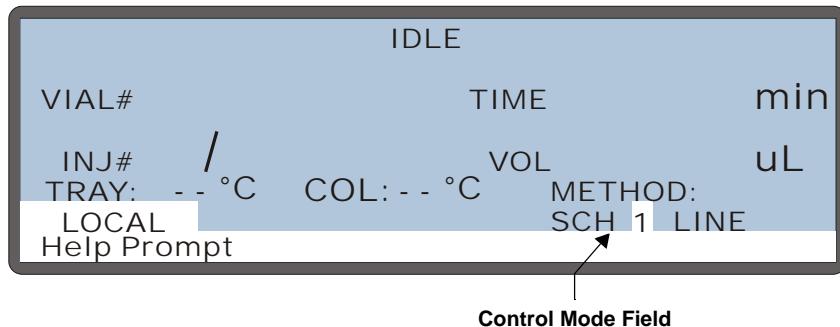
Control Mode Field

Figure 3-6.   Main Status Screen—Schedule Control Mode

3. Press **Enter**.

4. Press a numeric button to select the desired schedule number or press **Select** Δ or **Select** ∇ to cycle through the numbers (1 through 9).

5. Press **Enter**.

6. To start the schedule, press the **Hold/Run** button.

NOTE   **You can also select the schedule from the SCHEDULE screen (see Figure 3-7). Enter the number in the RUN field and press Enter. Press the Hold/Run button to start the schedule.**

LINE	VIAL# START- END		INJ/ VIAL	INJ VOL(uL)	METHOD
SCHEDULE EDIT 1 SAVE TO 1 RUN 1					
MISSING VIAL ACTION: SKIP					
1-4	1 -	4	3	25.0	1
5	5 -	5	1	25.0	1
6	6 -	6	1	5.0	1
Help Prompt					

Figure 3-7.   Schedule Screen

3.6   Putting a Schedule on Hold

To put a running schedule on hold, press **Hold/Run** or **Stop**.

The AS50 will finish the current method step before suspending operation.

While the schedule is on hold, the time since the last injection continues to count up. If the schedule is put on hold during a method's timed events, the timed events clock is suspended until the schedule resumes. See Section 2.6.8 for details about the clock displays.

To resume running the schedule, press **Hold/Run**.

> **NOTE** **If wait is enabled on the SYSTEM PARAMETERS screen (see Section C.6.5), the schedule is automatically put on hold when it reaches the wait step in a sample prep phase. The schedule will resume running only if a TTL signal is received (see Section D.2) or if the Hold/Run button is pressed.**

3.7   Stopping a Running Schedule

1.   To halt a schedule, press **Stop**.

2.   When the following message appears, press **Stop** again.

Press STOP again to abort.

Press HOLD/RUN to resume.

Help Prompt

Figure 3-8.   Stop Message Screen

When a schedule is aborted, the AS50 performs the following sequence of operations:

•   The sampling needle arm moves to the waste port and empties any fluid from the needle.

•   The needle arm moves to the flush port and delivers a volume of flush fluid that washes the outside of the needle.

•   The needle arm then moves to the inject port, where a volume of flush fluid is delivered for flushing the inject port.

•   The needle arm moves back to the flush port, and the outside of the needle is again flushed.

•   The needle arm moves to the home position.

3.8 Opening the Autosampler Door During a Schedule

Normally, the autosampler door must remain closed while the AS50 is running a schedule. If the door is opened inadvertently, the sampling arm stops immediately and the schedule is aborted.

If you want to open the door during a schedule, first press the **Door** button on the front panel, and then follow the on-screen instructions.

If it is not safe to open the door at this time, the following message appears:

```
STATUS: FLUSHING 250 uL

        OPEN DOOR SAFETY SCREEN

WARNING: Presently it is not safe to
open the autosampler door. Please wait.
Check the AS50 status above.
 NOTE: any key press will exit this mode
```

Figure 3-9. Open Door Safety Screen: Not Safe to Open Door

This message remains until the AS50 reaches the correct status and the sampling arm is in the home position. The screen then displays the message that it is safe to open the door (see Figure 3-10).

```
STATUS: WAITING

        OPEN DOOR SAFETY SCREEN

ATTENTION: It is now safe to open the
autosampler door. Please note time left
to safely open door.          Time=1.47
 NOTE: any key press will exit this mode
```
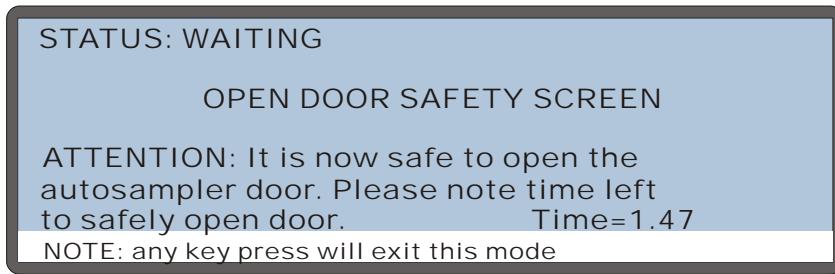
Figure 3-10. Open Door Safety Screen: Safe to Open Door

The **TIME** field counts down the amount of time remaining in which it is safe to open the door. When the door is opened, the schedule goes to hold. The timer continues counting down until the door is closed. The schedule then resumes.

If the door is still open when the timer reaches zero, the schedule continues holding (for up to 2 hours) until the door is closed. If the door is still open after 2 hours, the schedule is aborted.

Notes

- If the AS50 is operating under front panel control, the door can be opened only when the sampling arm is at the home position and the status displays **WAITING FOR CYCLE TIME TO EXPIRE**. The cycle time controls the time between injections (see Section 2.6.5 and Section 3.10.4). For most runs, selecting a cycle time greater than 4 minutes provides an adequate wait period between each injection for opening the door. If a method has a long sample prep phase, however, a longer cycle time may be required.

- If the AS50 is operating under Chromeleon control, the door can be opened only when the sampling arm is at the home position and the status displays **WAITING**. This occurs during the wait step of the sample prep portion of a method.

- If the AS50 never reaches a status that allows opening the door, check for one of the following:

    - If the AS50 is operating under front panel control, verify that a cycle time was specified for each method in the schedule and that the cycle time is long enough to provide a wait period between injections.

    - If the AS50 is operating under Chromeleon control, check the run length specified for the Chromeleon Method. It may need to be increased to allow a longer wait period between injections.

- To cancel the **OPEN DOOR SAFETY** screen, press any front panel button. If the door is open, a message cautions you that pressing a button again will abort the schedule.

3.9   Running Under Direct Control from the Front Panel

> NOTE   **This section describes how to control the AS50 directly from the front panel (Local mode). To run under direct control from the computer (Locked Remote mode), refer to the Chromeleon user's guide or online Help.**

The AS50 must be in Direct Control to initiate a manual flush or priming cycle, or to perform maintenance or diagnostic procedures.

The following AS50 functions can also be controlled directly (not as part of a schedule):

- TTL and relay outputs

- Injection valve position

- Injection valve 2 position (if installed)

- Tray temperature set point (if installed)

Selecting Direct Control Parameters

1. Go to the **DETAIL STATUS** screen (press **Menu** and **2**).

2. If the AS50 is not in Direct Control mode, position the cursor in the control mode field and press **Select** Δ or **Select** ∇ to toggle to **DIRECT CONTROL**. Press **Enter**.

```
DETAIL              IDLE
   VIAL#:          TIME:      min      TTL1 1
    INJ#:           VOL:      uL       TTL2 0
METHOD:            TRAY:  2  mL        RLY1 0
   TRAY: 25  20 °C↑ LOOP: 100    uL   RLY2 0
    COL: --    -- °C                  INJ VLV L
   LOCAL        DIRECT CONTROL        CS VLV A
 Help Prompt
```

Figure 3-11.   Detail Status Screen Example

3. Position the cursor in the field for the parameter to be changed.

4. To set the **TRAY** temperature:

   a. If the field is displaying "--", temperature control is currently turned off. Press **Select** Δ or **Select** ∇ to turn on temperature control.

   b. Press numeric buttons to enter the desired temperature setting.

5. For other parameters, press **Select** Δ or **Select** ∇ to select the desired setting.

   • TTL and relay fields: Select **1** for on, or **0** for off.

   • Inject valve(s): Select **L** to set the valve to load, or **I** to set the valve to inject.

6. After setting a parameter, press **Enter**.

Notes:

• The **TRAY** field is available only when the sample temperature control option is installed. Tray temperature can be set to between 4 °C and 60 °C.

IMPORTANT **Dionex does not recommend using the 10 mL plastic tray with the sample temperature control option because the plastic tray is inefficient at heating and cooling the vials. In addition, the tray is not designed for temperatures above 40 °C (104 °F) and may become deformed over time if used above 40 °C.**

• The **CS VLV** field is used to switch the position of a column switching valve. The column switching valve option is not currently available for the AS50 (USB). Keep the default setting (**A**) for this field.

• If the simultaneous injection option is installed, the **CS VLV** field is replaced with a field for controlling the second injection valve. See Appendix E for details about simultaneous injections.

3.10 Creating Methods from the AS50 Front Panel

> **NOTE** **This section describes how to create methods from the front panel (Local mode). To create methods from the computer, refer to the Chromeleon user's guide or online Help.**

A method defines a series of operating instructions that tells the AS50 how to perform a single injection. A method consists of three phases:

- Sample prep (Section 3.10.3)
- Method setup (Section 3.10.4)
- Timed events (Section 3.10.5)

Parameters for these are defined on separate screens. A method definition always includes the parameters from all three of the screens.

Notes

- The method phases are run in the order listed above. See Section 2.5.2 for details.

- A method can have a total of 100 steps, including the sample prep steps, the method setup (which counts as one step), and the timed events steps.

- You can create a new method when the AS50 is running, on hold, or stopped.

3.10.1 Creating a Method

1. Press **Menu** and **3** to go to the **METHOD MENU** screen (see Figure 3-12).

```
METHOD MENU        EDIT  25     SAVE TO  25

 1  SAMPLE PREP
 2  SETUP
 3  TIMED EVENTS


 Help Prompt
```
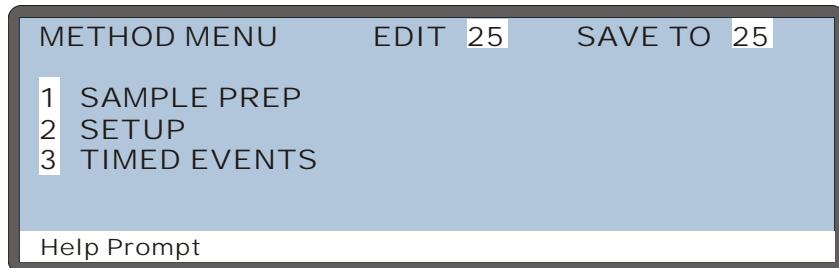
Figure 3-12. Method Menu

2. In the **EDIT** field, enter the number of an unused method.

3. Press **Enter**.

4. Go to each method screen and enter the method parameters.

   - For details about defining sample prep steps, see Section 3.10.3.

   - For details about selecting method setup parameters, see Section 3.10.4.

   - For details about defining timed events, see Section 3.10.5.

5. Save the method (see Section 3.10.2).

3.10.2 Saving a Method

1. From any of the three method screens, press the **Menu** button to return to the **METHOD MENU.**

2. Position the cursor in the **SAVE TO** field.

3. Do one of the following:

   - To save the current method, press **Enter**.

   - To save to a different method, enter a new number and then press **Enter**.

3.10.3 Defining Sample Prep Steps

Overview

Use the **SAMPLE PREP** screen (see Figure 3-13) to specify a sequence of operations to be performed before the method's timed events. Six standard sample prep operations are available: **DELAY**, **NEEDLE**, **PIPET**, **MIX**, **FLUSH**, and **WAIT**. In addition, if the sample preparation option is installed, **DISPENSE** and **DILUTE** operations are added.

Prep Operation	Description
DELAY	Specifies for how long the AS50 waits before proceeding to the next step in the sample prep phase.
NEEDLE	The height of the needle above the bottom of the vial.
PIPET	Moves a specified volume of sample from one vial to another.
MIX	Mixes the vial contents by repeatedly drawing and expelling a volume of sample.
FLUSH	Flushes the needle with a specified volume.
	This operation is independent from the flush that takes place before each injection in a schedule (see Section 2.6.6).
DISPENSE	Moves a specified volume of reagent from a reservoir to a vial.
DILUTE	Dilutes a volume of concentrate with a specified volume of diluent.
WAIT	The AS50 waits for a continue command before proceeding with the method. The command can be from the front panel (pressing **Hold/Run**) or a TTL input.

- Except for **WAIT**, each operation can be performed multiple times, or not at all.

- The sample prep steps must include a single wait step. The wait operation can be disabled, however, from the **SYSTEM PARAMETERS** screen (see Section C.6.5).

- When multiple injections are scheduled from a single vial, the sample prep phase is performed once only (before the first injection). The method setup and timed events are performed for each injection.

Specifying Vial Positions

Vial positions in prep operations can be specified by an absolute number or a relative position.

- To specify an absolute number, press the numeric button(s) for the desired position. The valid vial positions depend on which type of tray is installed:

Tray Type	Valid Vial Numbers
1.5 mL, aluminum	1 to 100
10 mL, plastic	1 to 49

- To enter a relative position, press **Select** Δ or **Select** ∇ to cycle through the choices. **SMP** is the sample vial specified for the current injection in the schedule. **S+1** is one vial past the sample vial. **S+2** is two vials past the sample vial, and so on, up to **S+9**. **WST** is the waste port.

Defining Sample Prep Steps

1. On the **METHOD MENU**, move the cursor to the **1** field (**SAMPLE PREP**) and press **Enter** to display the **SAMPLE PREP** screen (see Figure 3-13).


```
                          SAMPLE PREP        METHOD: 25
1    WAIT



   Help Prompt
```
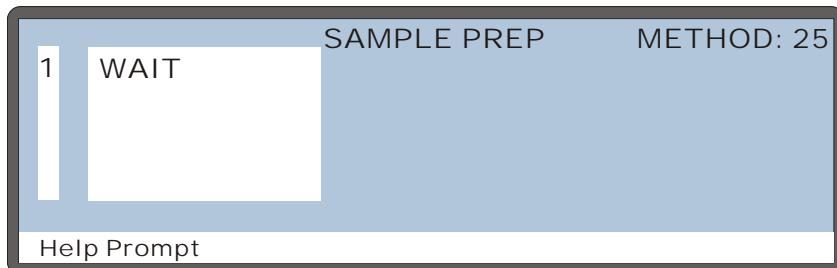
Figure 3-13. Sample Prep Screen (Default)

2. Press **Insert** to add a new step above the wait step. A **DELAY** step of 0 minutes is added by default (see Figure 3-14).


```
                    SAMPLE PREP        METHOD: 25
1   DELAY          0.0   min
2   WAIT
```

Help Prompt
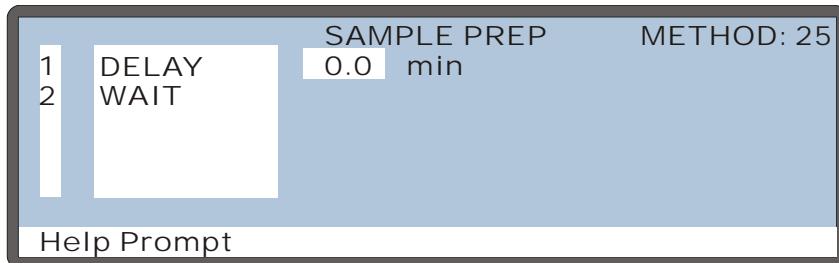
Figure 3-14. Example Sample Prep Screen

3. To select a prep operation, move the cursor one field to the right and press **Select** Δ or **Select** ∇ to scroll through the list of operations. As you select each type of operation, the parameters for that operation are displayed to the right.

4. Press **Enter** or a cursor arrow to select an operation.

5. After selecting an operation, enter its parameters. Refer to the following sections for details about each sample prep operation.

> **NOTE**   **To delete a sample prep step, position the cursor in the step's leftmost column and press Delete twice.**

Using the Wait Operation

The wait operation puts the method on hold until the AS50 receives a run command from the front panel **Hold/Run** button or a TTL input signal.

- The AS50 inserts a single wait operation at the end of every method's sample prep phase.

- You cannot delete the wait operation from the sample prep phase, but you can change its position or disable it.

The wait operation's position in the sample prep phase determines whether samples are run overlapped or sequentially. When the wait is the last sample prep step (the default), samples are overlapped (see Section 2.6.2). When the wait is the first sample prep step, samples are run sequentially (see Section 2.6.3).

Changing the Position of the Wait Operation in the Sample Prep Phase

- To insert a step above the wait line, position the cursor on the wait line and press the **Insert** button.

- To insert a step below the wait line, position the cursor on the blank line below wait and press the **Insert** button.

Enabling and Disabling the Wait Operation

1. If you are editing a method, save the current settings (see Section 3.10.2).

2. Go to the **MODULE SETUP** menu and press **5** to go to the **SYSTEM PARAMETERS** screen.

3. Position the cursor in the **WAIT** field and press **Select Δ** or **Select ∇** to toggle the field to **ENABLED** or **DISABLED**.

4. Press **Enter**.

Specifying a Delay Between Prep Steps

The **DELAY** operation specifies the number of minutes the AS50 waits before proceeding to the next step in the sample prep phase.

Number of Minutes to Delay
Before Performing Next Step

| DELAY | 0.0 | min |

Delay Time

0.0 to 999.9 min
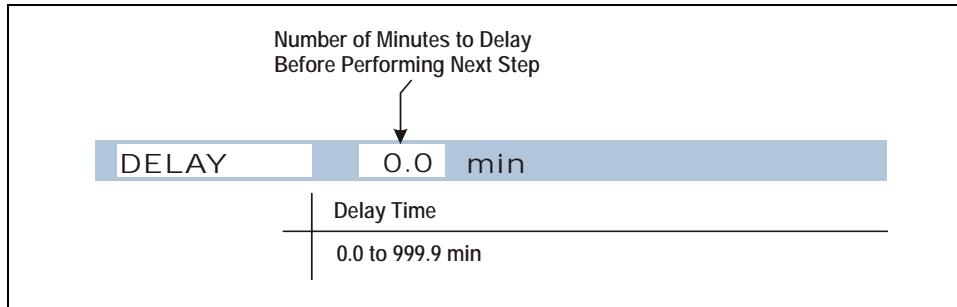
Specifying a Needle Height

The **NEEDLE** operation positions the tip of the needle at the distance above the bottom of the vial. Zero is closest to the bottom; 46 is closest to the top of the vial. The height applies to subsequent **PIPET**, **MIX**, and **DISPENSE** operations. When pipetting, the height applies only to the source vial.

NOTE **For 0.3 mL and 1.5 mL vials, use a maximum needle height of 2 mm, to ensure the needle's vent is positioned correctly inside the vial.**

Height of Needle
from Bottom of Vial

| NEEDLE | 2 | mm |

Needle Height

0 to 46 mm
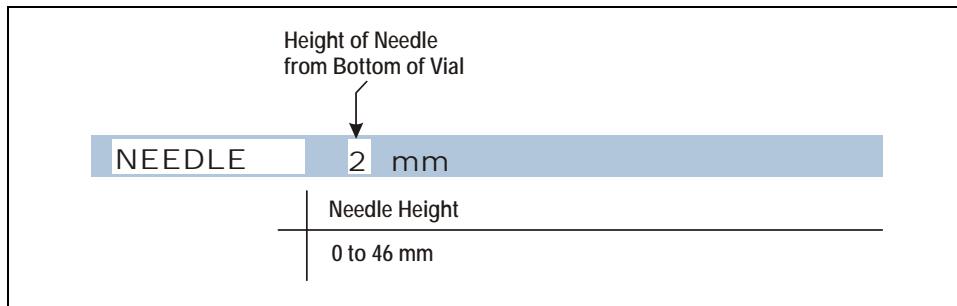
NOTE **The needle height specified here does not change the default sample needle height specified on the METHOD SETUP screen (see Section 3.10.4).**

Pipetting Liquid from One Vial to Another

The **PIPET** operation uses the sample syringe to transfer liquid from a source vial to a destination vial. After pipetting, mix the destination vial before sampling from it. Be sure to specify enough mix cycles to completely mix the vial contents (see "Mixing a Vial" below).

Volume to Pipet   Source Vial   Destination Vial

PIPET   20.0   uL   #S+1   to   #SMP

Volume to Pipet	Source Vial	Destination Vial
1.0 to 99.9 μL	1 to 100 (aluminum tray)	1 to 100
100 to 1000 μL	1 to 49 (plastic tray)	1 to 49
	SMP, S+1, ..., S+9	SMP, S+1, ..., S+9, WST

NOTE **Unlike the DILUTE operation, the PIPET operation does not include an automatic mixing step. If the sample preparation option is installed, use the DILUTE operation, not PIPET, for dilutions (see "Diluting" on page 3-25).**

Mixing a Vial

The AS50 mixes the vial by repeatedly drawing up and expelling a volume of the contents. The prep syringe is used if the sample preparation option is installed; otherwise, the sample syringe is used. When specifying the volume, enter a value that is less than or equal to the volume of the syringe. If the volume is greater than the syringe volume, an error message occurs and the syringe volume is used.

Volume to
Aspirate and   Number of
Vial to Mix   Expel per Cycle   Mix Cycles

MIX   #SMP   250   uL   10   times

Vial to Mix	Volume	Cycles
1 to 100 (aluminum tray)	1 to 9999 μL	1 to 99
1 to 49 (plastic tray)		
SMP, S+1, ..., S+9		

Flushing the Needle

The sample syringe is used to flush the needle with the specified volume of liquid. If you specify a volume greater than the syringe volume, multiple flushes are done.

Volume to Flush
Through Needle

FLUSH   **250**   **uL**

Flush Volume

1 to 999 μL

Dispensing from a Reagent Reservoir

DISPENSE is available only if the sample preparation option is installed. During dispensing, the prep syringe moves a volume of reagent from a reservoir to a vial.

Volume to Dispense   Source Reservoir   Destination Vial

DISPENSE   **1000**   **uL**   **RES C**   **to**   **#100**

Volume	Reservoir	Destination Vial
1.0 to 99.9 μL 100 to 1000 μL	RES A, B, C, D	1 to 100 (aluminum tray) 1 to 49 (plastic tray) SMP, S+1, ..., S+9, WST

Diluting

DILUTE is available only if the sample preparation option is installed. The following steps occur during a dilution:

- The sample syringe picks up a volume of concentrate from the concentrate vial and dispenses it to the destination vial.

- The prep syringe dispenses a volume of diluent to the destination vial.

- The sample syringe mixes the destination vial five times, using 80% of the volume in the vial.

- The sample syringe is flushed with a volume equal to the amount of concentrate plus one full syringe stroke.

	Concentrate Volume	Concentrate Vial	Diluent Volume	Diluent Reservoir	Destination Vial
DILUTE	12.3 uL	#S+1	+1234 uL	A →	#SMP

Concentrate Volume	Concentrate Vial	Diluent Volume	Diluent Reservoir	Destination Vial
1.0 to 99.9 μL	1 to 100 (aluminum tray)	100 to	RES A, B	1 to 100 (aluminum tray)
100 to 1000 μL	1 to 49 (plastic tray)	9999 mL	C, D	1 to 49 (plastic tray)
	SMP, S+1, ..., S+9			SMP, S+1, ..., S+9
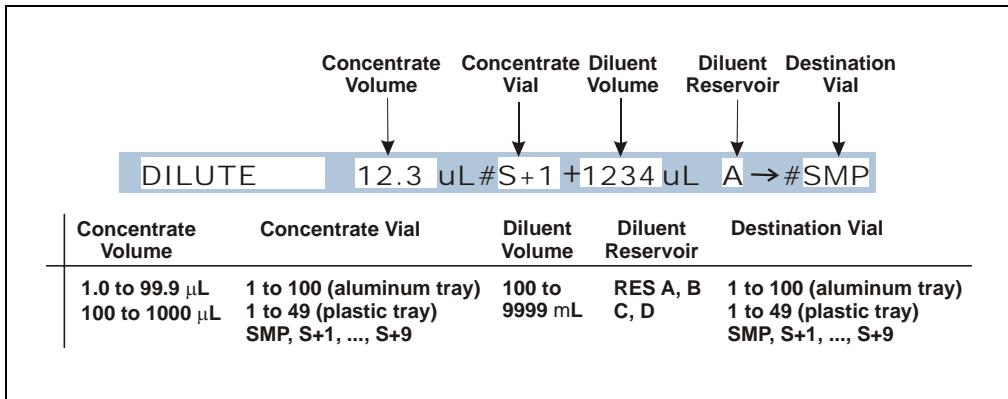
3.10.4 Selecting Method Setup Parameters

To go to the **METHOD SETUP** screen:

1. Go to the **METHOD MENU.**

2. Position the cursor on the **2** field **(SETUP)**.

3. Press **Enter**.

Figure 3-15 shows the default setup parameters.

```
METHOD SETUP      METHOD: 25

              CYCLE TIME: ---    min
   SAMPLE NEEDLE HEIGHT: 2       mm
      TRAY TEMPERATURE: ---      °C
   COLUMN TEMPERATURE: ---       °C
   WAIT FOR TEMP  STABLE: NO
Help Prompt
```
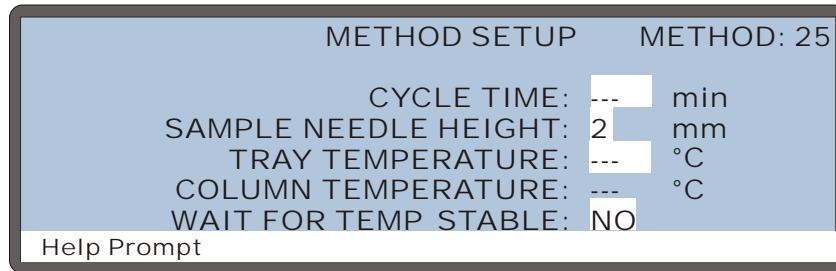
Figure 3-15. Method Setup Screen (Default)

The table below shows the value ranges for each parameter. See the following section for details about each parameter.

Parameter	Value Range	Default
Cycle Time	1 to 240 minutes	Off (---)
Sample Needle Height	0 to 46 mm	2 mm*
Tray Temperature (optional)	4 to 60 °C	Off (---) 20 °C (when on)
Wait For Temp Stable	Yes/No	No

*Sample needle height is measured from the bottom of the vial. Zero mm is closest to the bottom; 46 mm is closest to the top of the vial.

Controlling the Time Between Injections (Cycle Time)

The **CYCLE TIME** parameter is an optional feature that can be used to control the time between injections. See Section 2.6.5 for details.

1. On the **METHOD SETUP** screen, position the cursor in the **CYCLE TIME** field.

2. If the field displays "--", press **Select** Δ or **Select** ∇ to toggle the cycle time to on.

3. Press numeric buttons to enter the desired time between injections.

4. Press **Enter**.

Controlling the Needle's Position in the Vial

The **SAMPLE NEEDLE HEIGHT** parameter positions the tip of the needle at the specified distance above the bottom of the vial. This height is always used for sample injections. It is also the default height for mixing, pipetting, and dispensing, unless a **NEEDLE** operation is specified in the sample prep steps (see Section 3.10.3).

1. On the **METHOD SETUP** screen, position the cursor in the **SAMPLE NEEDLE HEIGHT** field.

2. Press numeric buttons to enter the height setting.

3. Press **Enter**.

Setting the Tray Temperature

The **TRAY TEMPERATURE** parameter is available only when the sample temperature control option is installed. Otherwise, this field will display "--" and will not be illuminated.

1. On the **METHOD SETUP** screen, position the cursor in the **TRAY TEMPERATURE** field.

2. If the field displays "--", tray temperature control is currently turned off. Press **Select** Δ or **Select** ∇ to toggle tray temperature control to on.

3. Press numeric buttons to enter the desired temperature setting.

4. Press **Enter**.

Waiting for the Temperature to Stabilize

The **WAIT FOR TEMP STABLE** parameter delays the start of the method until the temperature of the sample tray has reached the specified set point(s).

1. Position the cursor in the **WAIT FOR TEMP STABLE** field.

2. Press **Select** Δ or **Select** ∇ to select either **YES** (wait) or **NO** (do not wait).

3. Press **Enter**.

3.10.5 Defining Timed Events Steps

To go to the **TIMED EVENTS** screen:

1. Go to the **METHOD MENU.**

2. Position the cursor in the **3** field **(TIMED EVENTS)**.

3. Press **Enter**.

Figure 3-16 shows the default screen.

TIME	VALVE	CSV	TTL1	TTL2	RLY1	RLY2
INIT	LOAD	A	0	0	0	0
0.00	INJECT					

TIMED EVENTS   METHOD: 25

Help Prompt
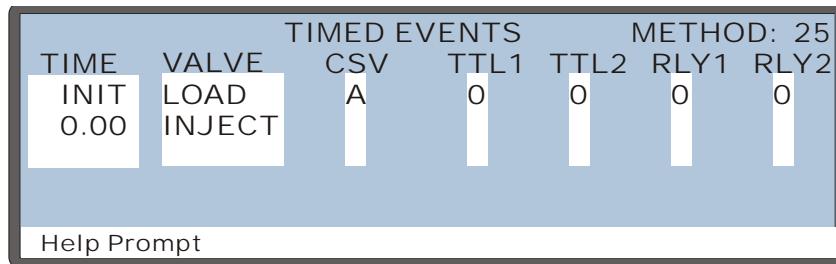
Figure 3-16. Timed Events Screen (Default)

NOTE If the simultaneous injection option is installed, the CS VLV field is replaced with a field for controlling the second injection valve. See Appendix E for details about simultaneous injections.

Understanding the INIT and Time Zero Steps

The method timed events always start with two steps. The parameters in these steps can be changed, but the steps cannot be deleted.

- The first step is the **INIT** (initial conditions) step. The initial conditions are executed immediately after the method setup.

- The second step is the time zero step, which is executed after the **INIT** step. When the time zero step is executed, the timed events clock begins counting up from zero and any additional timed events run at their specified times.

> **NOTE** When a cycle time is specified, the AS50 delays executing the time zero step until the specified time has elapsed since the previous injection (see **Section 2.6.5** for details).

Adding Timed Events Steps

1. Use one of the following methods to add a step:

   - Move the cursor to the empty **TIME** field below the last step. Enter the elapsed time at which to start the new step and press **Enter** or a cursor arrow button.

   - Move the cursor to any **TIME** field and press **Insert**. This adds a new step before the cursor position. Enter the elapsed time at which to start the new step and press **Enter** or a cursor arrow button.

   After you add a step, the steps are reorganized in chronological order.

2. Enter the remaining parameters for the new step (see the following sections).

   To retain a value set in the previous step, leave the field blank. A blank field means there is no change from the previous step.

Deleting Timed Events Steps

To delete a step, move the cursor to the step's **TIME** field and press **Delete** twice.

Controlling the Injection Valve

The **VALVE** parameter sets the position of the injection valve to either **LOAD** or **INJECT**. A method's timed events can include only one Load and one Inject command. The Load command must precede the Inject.

By default, the valve is set to **LOAD** in the **INIT** step and to **INJECT** in the time zero step. This allows the valve to be loaded before timed events begin. Then, you do not need to include the time for loading the loop in the timed events.

You can clear the **LOAD** and **INJECT** parameters from the **INIT** and/or time zero steps and then move them to other steps if desired.

- To clear a **LOAD** or **INJECT** parameter, position the cursor in the field and press **Delete**.

- To move the **LOAD** or **INJECT** parameter to a different step, position the cursor in the **VALVE** field of the desired step and press **Select** Δ or **Select** ∇ to toggle to **LOAD** or **INJECT**.

Notes

- If you move the **LOAD** and/or **INJECT** parameters to different steps, be sure to allow enough time between the **LOAD** and the **INJECT** for the loop to be completely loaded. The time needed depends on the sample syringe volume and the syringe speed (see Section 3.13).

- If the simultaneous injection option is installed, you can set the positions of both valves in the timed events (see Section E.4).

Setting TTL and Relay Outputs

The AS50 has two TTL and two relay outputs for control of functions in other devices. For example, if you connect TTL output 1 on the AS50 to TTL input 1 on a pump, a signal from the AS50 will turn the pump motor on and off.

In the **TTL** and **RLY** fields on the **TIMED EVENTS** screen, select **1** (on) or **0** (off).

See Appendix D for details about TTL and relay control.

3.10.6 Editing a Method

After creating a method, you can modify it by changing, adding, or deleting steps and parameters. These changes can be made at any time. If the method you are editing is currently running, changes made to steps that have not yet been completed are performed in the current run. Changes made to steps that have already been completed are performed the next time the method runs.

1. Go to the **METHOD MENU** screen (press **Menu** and **3**).

2. In the **EDIT** field, enter the number of the method to be edited.

3. Go to the method screen to be changed and edit the parameters as required.

4. Save the method (see <u>Section 3.10.2</u>). The changes can be saved to the same method number or to a new (unused) method number. If you save to a new number, the original method remains unchanged.

3.10.7 Deleting a Method

1. Go to the **METHOD MENU** screen (press **Menu** and **3**).

2. Position the cursor in the **EDIT** field and press **Delete**.

    A confirmation message appears.

3. Press **Delete** again to delete the method.

3.10.8 Copying a Method

1. Go to the **METHOD MENU** screen (press **Menu** and **3**).

2. Position the cursor in the **EDIT** field and enter the number of the existing method to be copied.

3. Position the cursor in the **SAVE TO** field and enter a new (unused) method number.

4. Press **Enter**.

   The parameters from the original method are copied to the new method and the original method is unchanged.

3.10.9 Example Method

> **NOTE** **The sample preparation option is required for this method.**

This method uses the sample preparation option to dilute a sample before injection. In this method, the AS50 delivers 600 μL of the concentrated sample from vial 6 and 5400 μL of diluent from reagent reservoir A to the sample vial. Default values are used for all other method parameters. Figure 3-17 shows the sample prep steps for the method.


```
                    SAMPLE PREP        METHOD: 1

1    DILUTE          600uL # 6  +5400uL  A → #SMP
2    WAIT



Help Prompt
```
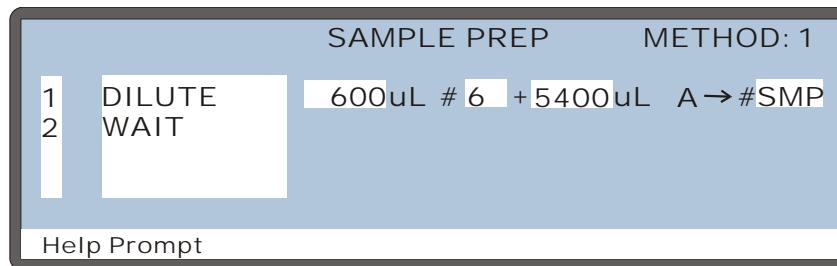
Figure 3-17. Dilution Method Example: Sample Prep Steps

3.11 Creating Schedules from the AS50 Front Panel

The schedule defines injection parameters for each vial to be sampled. A schedule consists of the following parameters:

- The vials to sample

- The number of injections to draw from each vial

- The volume of each injection

- The method to run on each injection

- The action to take when a scheduled vial is missing

You can create a new schedule or edit an existing schedule when the AS50 is running, on hold, or stopped. If the schedule you are editing is currently running, changes to steps that have not yet been completed are performed in the current run. Changes made to steps that have already completed are performed the next time the schedule runs.

3.11.1 Creating a New Schedule

1. Go to the **SCHEDULE** screen.

    If you are opening the screen for the first time after the power is turned on, the screen displays an empty (unused) schedule (see Figure 3-18). Otherwise, the screen displays the last schedule that was edited.
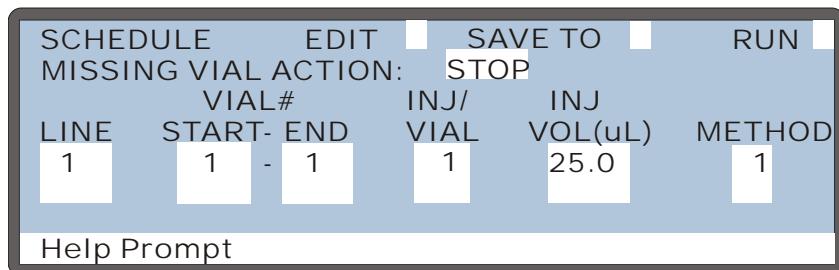
Figure 3-18. Schedule Screen (Default Settings)

2. If a schedule is currently displayed, position the cursor in the **EDIT** field. Enter the number of an unused schedule, or press **Select** Δ or **Select** ∇ to cycle through the choices (1 through 9).

3. Press **Enter**.

4. Select an action to take if a vial is missing (see <u>Section 3.11.3</u>).

5. Define the schedule lines required for your sample injections (see <u>Section 3.11.4</u>).

> **NOTE** **If injections per vial is zero for a particular vial, only the sample prep phase of the method is run.**

6. Save the schedule.

3.11.2 Saving a Schedule

1. Position the cursor in the **SAVE TO** field.

2. Do one of the following:

   - To save the current schedule, press **Enter**.

   - To save to a different schedule, enter a new number and then press **Enter**.

3.11.3 Selecting an Action if a Scheduled Vial Is Missing

Before beginning each injection, the AS50 checks that a vial is present in the scheduled position in the tray. If the vial is missing, the AS50 can either stop and wait, or skip the vial and continue. The action is specified in the schedule.

1. In the **SCHEDULE** screen, move the cursor to the **MISSING VIAL ACTION** field and select either **STOP** or **SKIP**.

   STOP: The AS50 stops when a scheduled vial is missing, allowing you to place a vial in position. To resume the schedule, press **Hold/ Run**.

   SKIP: The AS50 ignores a missing vial and continues to the next vial.

2. Press **Enter** or a cursor arrow to confirm the choice.

3.11.4 Defining Schedule Lines

Each schedule *line* contains operating parameters for one vial. Line numbers are automatically generated when you define parameters for the vials in the schedule. If the parameters are different for each vial, line numbers are shown consecutively. If you define identical parameters for a series of vials, line numbers are shown in a range format (see Figure 3-19). A schedule can include up to 999 lines.

Each range of vials (or one horizontal line on the screen) is one schedule *step* (see Figure 3-19). A schedule can have up to 203 steps.

Figure 3-19.   Schedule Screen Example

Inserting Steps

Position the cursor in the **LINE** field below where you want the new step to appear and press **Insert**.

Notes

- The new step is inserted above the cursor.

- The **START** and **END** vial numbers are set to one more than the previous end number. Other parameters (injections per vial, injection volume, and method number) are copied from the previous step.

- If you insert a new step at the beginning of a schedule, parameters are copied from the first step.

- To add a step at the end of a schedule, position the cursor on the blank step at the bottom of the screen and press **Insert**.

Deleting Steps

Position the cursor in the step's **LINE** field and press **Delete** twice.

LINE

After you enter the **START** and **END** vial numbers, the **LINE** field displays the appropriate schedule line numbers. You cannot edit the **LINE** field.

START and **END**

Enter the starting and ending vials for a range of vials to be sampled.

Tray Type	Tray Capacity	Valid Vial Numbers
1.5 mL, aluminum	100 vials (1.5 or 0.3 mL)	1–100
10 mL, plastic	49 PolyVials	1–49

- A range is a group of consecutively numbered vials that will be sampled using the same schedule parameter values (injections per vial, injection volume, and method number). The starting vial can be a higher number than the ending vial.

- For a single vial, enter the same number for **START** and **END**.

INJ/VIAL

Enter the number of injections (0 to 99) to perform on each vial.

- If you enter 0, only the sample prep phase of the method is run.

- If you enter multiple injections per vial, the sample prep phase of the method is performed once only (before the first injection). The method setup and timed events are performed for each injection.

INJ VOL

Enter the volume of sample to deliver for each injection.

Number of Valves	Syringe Size	Inject Volume Ranges	Default
1*	1000 μL or smaller	1.0–99.9 μL 100–1000 μL	25 μL
2 (simultaneous injection**)	5 mL 10 mL	1000–5000 μL 1000–8000 μL	1000 μL

* The volume entered determines whether the injection is a full-loop; partial-loop; or partial-loop, limited-sample. See Section 3.11.5 for details.

** Simultaneous injection is always full-loop.

METHOD

In the **METHOD** field, enter the method to run (1 through 99) on each vial in the range.

3.11.5 Editing a Schedule

1. Go to the **SCHEDULE** screen.

2. In the **EDIT** field, enter the number of the schedule to be edited.

3. Press **Enter**.

4. Change the schedule parameters.

5. Save the schedule. The changes can be saved to the same method number or to a new (unused) method number. If you save to a new number, the original method remains unchanged.

3.11.6 Deleting a Schedule

1. Go to the **SCHEDULE** screen.

2. Position the cursor in the **EDIT** field and press **Delete**.

   A confirmation message appears.

3. Press **Delete** again to delete the schedule.

3.11.7 Copying a Schedule

1. Go to the **SCHEDULE** screen.

2. Position the cursor in the **EDIT** field and enter the number of the schedule to be copied.

3. Position the cursor in the **SAVE TO** field and enter a new (unused) schedule number.

4. Press **Enter**. The parameters from the original schedule are copied to the new schedule and the original schedule is unchanged.

3.12 Choosing the Injection Type

Three types of sample injections are possible:

- **Full-loop**—the full loop volume is injected

- **Partial-loop**—a partial volume of the loop is injected

- **Partial-loop, limited-sample**—a partial volume of the loop is injected, and no extra sample is aspirated from the vial

> **NOTE If the AS50 is set up for simultaneous injections, only full-loop injections can be performed (see <u>Section E.4</u>).**

The table below summarizes the injection types. See the following sections for details.

Injection Type	Injection Volume*	Cut Volume	Sample Volume Used	Volume Injected
Full-loop	≥ Loop volume	Ignored	4 X Loop volume or 2.5 X Loop volume + 25 μL (whichever is greater)	Loop volume
Partial-loop	< Loop volume**	1–30 μL	Injection volume + 2 X cut volume	Injection volume from schedule
Partial-loop, limited sample	< Loop volume***	0	Injection volume	Injection volume from schedule

* Injection volume is entered on the **SCHEDULE** screen (see <u>Section 3.11.4</u>) or in the Chromeleon sequence in the Browser.

** For the best accuracy when performing partial-loop injections, specify an injection volume equal to half the loop volume or less. For example, if the loop is 100 μL, use an injection volume of 50 μL or less.

*** For the best accuracy when performing partial-loop, limited sample injections, specify an injection volume no greater than the loop volume minus the air bubble volume (8 μL). For example, if the loop is 25 μL, use an injection volume of 17 μL or less. Note: The sample is positioned between two air bubbles when it is loaded into the loop.

During an injection, the **DETAIL STATUS** screen displays the type of injection.

```
DETAIL              INJECTING
  VIAL#: 1          TIME: 12.5    min      TTL1  0
   INJ#: 1/3         VOL: 25      uL       TTL2  1
METHOD: 0           TRAY:  2  mL           RLY1  0
   TRAY: 25  20 °C↑ LOOP: 100    uL        RLY2  0
    COL: --    -- °C  PARTIAL          INJ VLV  L
  REMOTE           SCH 0  LINE          CS VLV  A
  Help Prompt
```
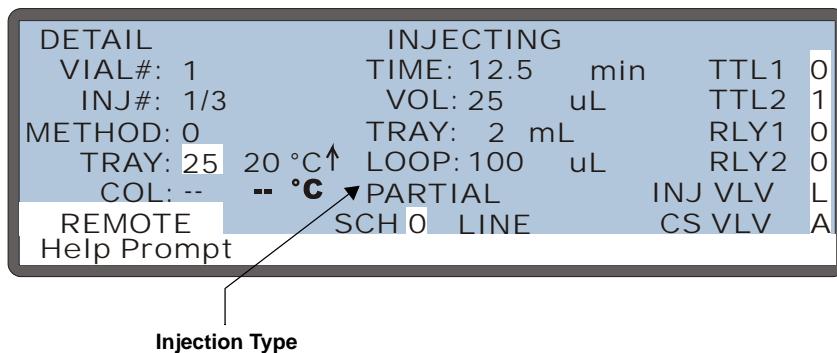
Injection Type

Figure 3-20. Detail Status Screen: Partial-Loop Injection Type

3.12.1 Full-Loop Injections

When performing a full-loop injection, the AS50 draws four times the loop volume from the sample vial and delivers it to the injection valve. The middle portion of the sample is positioned in the loop and injected (see Figure 3-21).

NOTE   For very small loop sizes (less than 17 μL), 2.5 times the loop volume plus 25 μL is delivered to the valve.
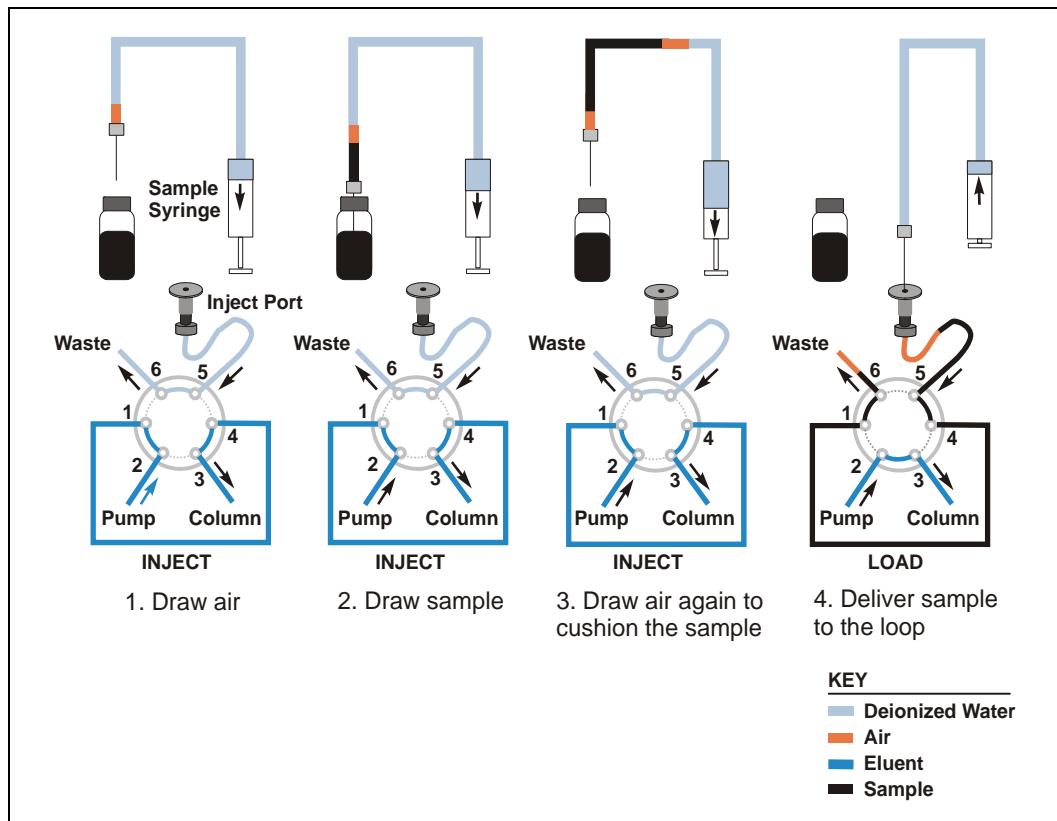
Figure 3-21. Full-Loop Injection Sequence

IMPORTANT

The maximum loop size for full-loop injections is 300 μL (1100 μL for simultaneous injections). If a larger loop size is used, sample can contaminate the flush bottle because the sample volume drawn exceeds the sample transfer line volume of 1200 μL (8200 μL for simultaneous injections).

Setting Up a Full-Loop Injection

When defining injection parameters on the **SCHEDULE** screen (see Figure 3-22), enter an injection volume equal to or greater than the volume of the loop installed on the injection valve.

> NOTE **Entering an injection volume greater than the sample loop volume sets up the AS50 for a full-loop injection. The actual volume of sample injected will equal the sample loop volume.**

> NOTE **The loop volume is entered on the PLUMBING CONFIGURATION screen (see Section C.6.3).**

```
SCHEDULE      EDIT       SAVE TO        RUN
MISSING VIAL ACTION:    STOP
              VIAL#      INJ/      INJ
LINE     START- END     VIAL     VOL(uL)   METHOD
  1        1  -  1        1       25.0        1


Help Prompt
```

Enter the injection volume
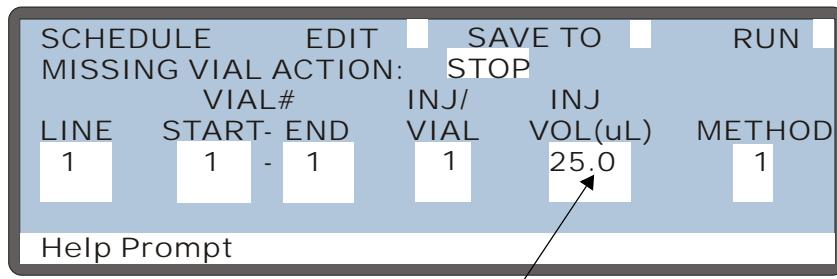
Figure 3-22. Schedule Screen

3.12.2 Partial-Loop Injections

When performing a partial-loop injection, the AS50 draws the volume to be injected from the sample vial plus two times the *cut segment volume.* The cut segment volume is a portion of sample that is discarded from each end of the aspirated sample. The middle portion of the sample is positioned in the loop and injected (see Figure 3-23).

NOTE If the AS50 is set up for simultaneous injections, only full-loop injections can be performed.
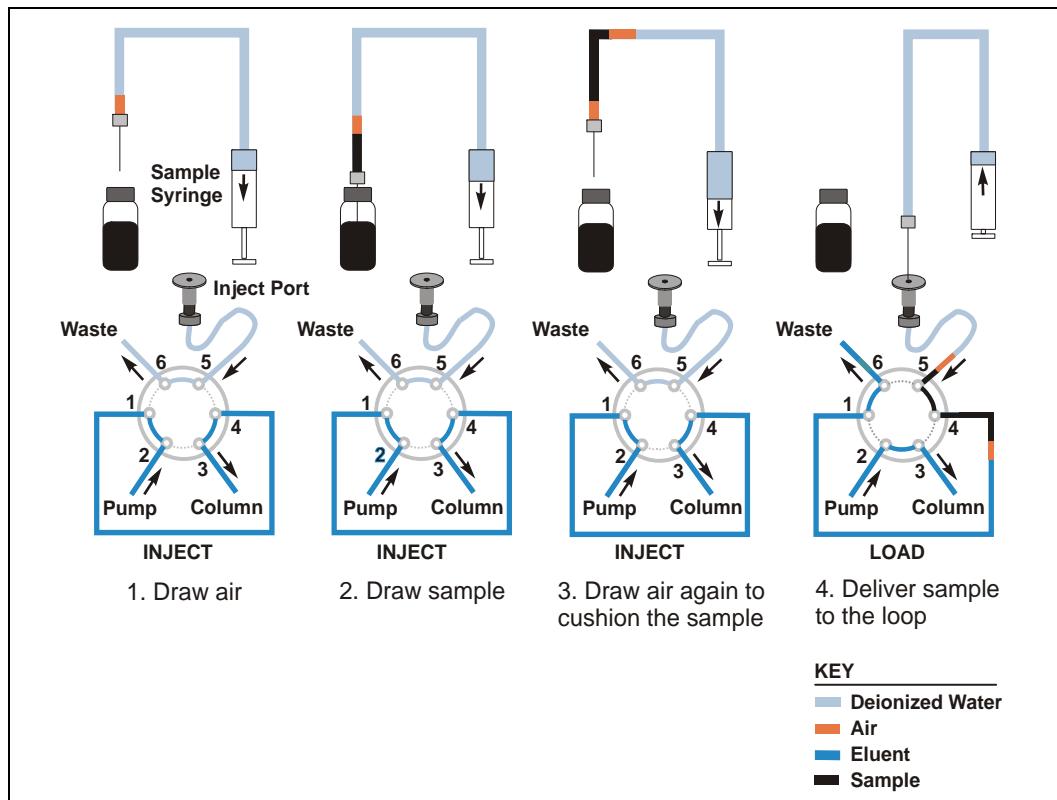
Figure 3-23. Partial-Loop Injection Sequence

Setting Up a Partial-Loop Injection

1. When defining injection parameters on the **SCHEDULE** screen, enter a sample injection volume that is less than the volume of the sample loop installed on the injection valve.

2. On the **SYSTEM PARAMETERS** screen (see <u>Section C.6.5</u>), enter a **CUT SEGMENT VOLUME** greater than zero. The cut volume amount will be subtracted from both ends of the injected sample volume.

   Example:

   Sample loop volume: 100 µL
   Injection volume: 50 µL
   Cut segment volume: 20 µL

   To perform the injection, the AS50 aspirates 90 µL from the sample vial (the inject volume plus double the cut volume) and delivers it to the injection valve. One cut segment volume (20 µL) passes to waste and the next 50 µL is loaded into the loop. At injection, 50 µL is injected. After injection, the remaining cut segment volume (20 µL) flows to waste.

3.12.3 Partial-Loop, Limited-Sample Injections

When performing a partial-loop, limited-sample injection, the AS50 draws only the volume to be injected from the sample vial (see Figure 3-24).

NOTE **If the AS50 is set up for simultaneous injections, only full-loop injections can be performed.**
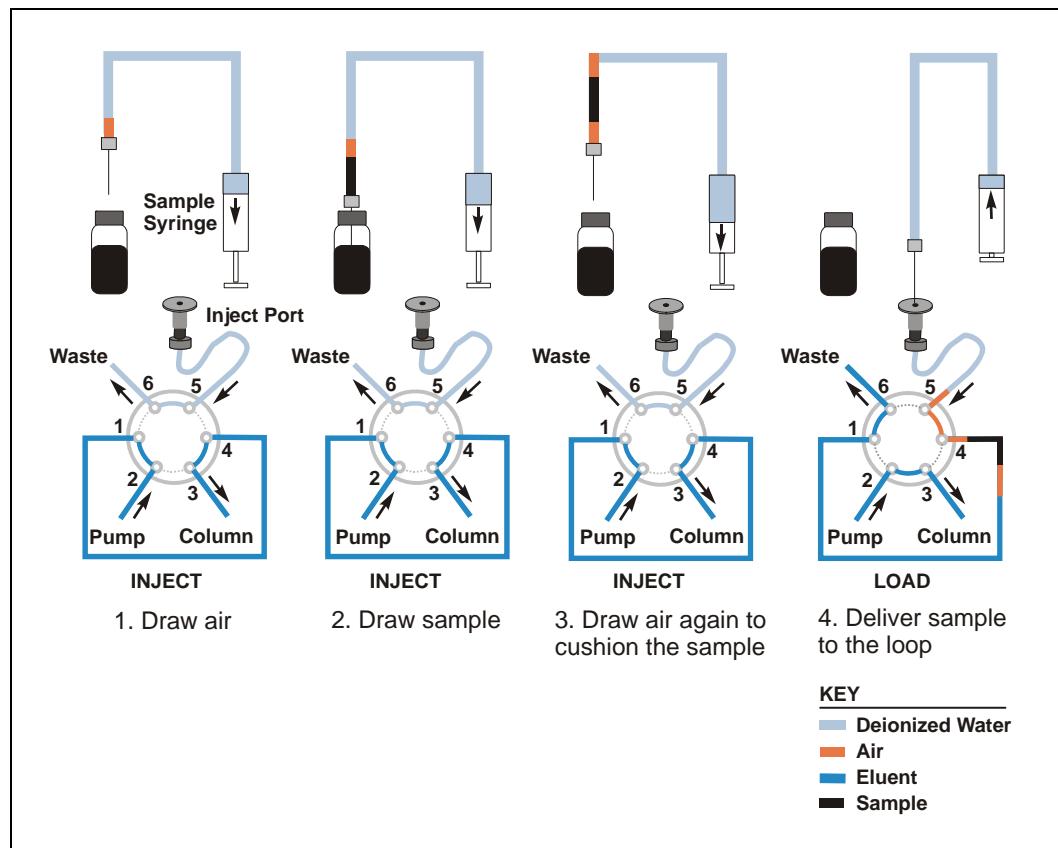
Figure 3-24. Partial-Loop, Limited-Sample Injection Sequence

Setting Up a Partial-Loop, Limited-Sample Injection

1. When defining injection parameters on the **SCHEDULE** screen, enter a sample injection volume that is less than the volume of the sample loop.

2. On the **SYSTEM PARAMETERS** screen, enter a **CUT SEGMENT VOLUME** of **0**.

3.13 Adjusting the Sample Syringe Speed for Different Sample Viscosities

1. Go to the **SYSTEM PARAMETERS** screen (press **Menu**, **5**, and **5**).

2. Position the cursor in the **SYRINGE SPEED** field.

3. Press **Select** Δ or **Select** ∇ to select the desired speed or enter the speed by pressing a numeric button (1–5). 1 is the slowest speed and 5 is the fastest. The default speed is 3. Select a slower setting for more viscous samples.

The syringe speed selected on the **SYSTEMS PARAMETERS** screen is used for the following operations:

- Aspirating and dispensing sample during loop loading

- Aspirating and dispensing sample during sample prep operations, except for mixing and dilution

- Aspirating from and dispensing to the flush reservoir during sample prep operations and loop loading

- Aspirating an air bubble

Factory-set speeds are used for the following operations:

- Aspirating and dispensing sample during mixing

- Aspirating and dispensing concentrate during dilution

- Aspirating and dispensing reagent

- Flushing

3.14 Routine Maintenance

This section describes routine maintenance procedures that the user can perform. Any other maintenance procedures must be performed by Dionex personnel.

3.14.1 Daily

- Check for air bubbles in the syringe(s) and tubing and remove them if they appear (see Section B.3.11).

- Check the volume of liquid in the flush bottle (and reagent bottle(s) if installed) and refill when needed. After refilling the flush reservoir, manually flush the inject port (see Section 3.14.4).

- Check the volume of liquid in the waste container and empty when needed.

⚠️ **CAUTION**

Neutralize acidic and caustic wastes before disposal. Dispose of all wastes in accordance with local regulations.

⚠️ **MISE EN GARDE**

Neutralisez les déchets acides ou caustiques avant de les jeter. Jetez les déchets aux règlements locaux.

⚠️ **VORSICHT**

Neutralisieren Sie säurehaltige und ätzende Abfälle vor ihrer Entsorgung. Entsorgen Sie alle Abfälle entsprechend den lokalen Bestimmungen.

IMPORTANT

For correct drainage, make sure the end of the waste line is not submerged in waste liquid.

3.14.2 Periodically

- Check the alignment of the sampling arm needle. If the needle is not centered in the inject port opening when it enters the port, realign the needle. See Section 5.7 for instructions.

- Remove the drip tray (see Section 5.4), rinse the tray and the leak sensor, dry thoroughly, and replace (see Section 5.5).

- Check for leaks from the inject port, the syringe(s), the syringe valve(s), and the sampling needle line. See <u>Section 4.2</u> if leaks occur.

3.14.3 Annually

Perform the AS50 preventive maintenance procedure. An AS50 Preventive Maintenance Kit is available for this purpose. The kit provides parts and instructions for performing the procedure.

3.14.4 Manually Flushing the Inject Port

Flush the inject port after refilling the flush reservoir. The AS50 must be idle to initiate a flush cycle.

1. Set the AS50 to **LOCAL** mode and **DIRECT CONTROL**.

2. Go to the **FLUSH/PRIME** screen (press **Menu** and **6)** and enter the desired **FLUSH VOLUME**, or keep the default value.

3. Move the cursor to the **ACTION** field and select **FLUSH** (see Figure 3-25).

4. Press **Enter** to start the flush.

```
                   FLUSH/PRIME
    FLUSH                        PRIME
       VOLUME:  400  uL           VOLUME:  400  uL
    RESERVOIR: FLUSH           RESERVOIR: RES A
      SYRINGE: SAMPLE            SYRINGE: PREP
       ACTION: FLUSH              ACTION: READY

  Help Prompt
```
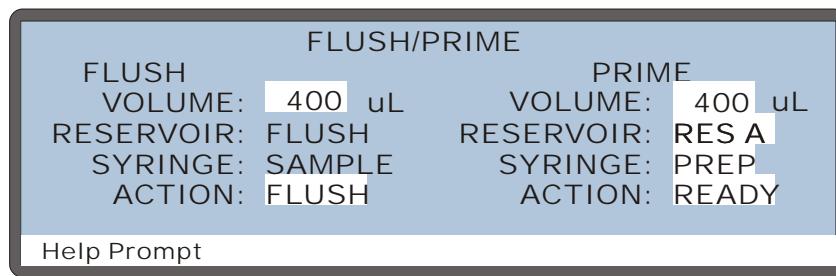
Figure 3-25. Initiating a Manual Flush Cycle

3.15 System Shutdown

No special system shutdown procedure is required. To automatically shut down if you are using Chromeleon to control the AS50, load a shutdown program at the end of the schedule that turns off the pump flow and the suppressor current.

4 • Troubleshooting

This chapter is a guide to troubleshooting minor problems that may occur while operating the AutoSelect AS50 Autosampler.

- describes error messages and how to troubleshoot them.

- The remaining sections in this chapter describe other operating problems. Turn to the section that best describes the operating problem. There, possible causes of the problem are listed in order of probability.

For additional help, refer to Appendix C for instructions on running the AS50 diagnostics program.

If you are unable to eliminate a problem, contact Dionex for help. In the U.S., call Dionex Technical Support at 1-800-346-6390. Outside the U.S., call the nearest Dionex office.

4.1 Error Messages

When an error occurs, a beep sounds and a message appears. Each message is identified by a number in brackets in the lower-right corner of the AS50 screen. To clear the message, press any key.

Most error messages occur because you have pressed an incorrect key or attempted to enter an incorrect value for a particular field. These types of messages generally do not need additional explanation and they are not listed here.

- **[232] Maximum number of steps reached.**

   A method can have a maximum of 100 steps, including the sample prep steps, the timed events steps, and one step for the method setup parameters.

   Possible Causes: The method includes 100 steps.

   Actions: No action is required at this time. However, before trying to create a new step in the method, delete an existing step.

- **[237] Memory is full. Cannot save additional method or schedule.**

  The current method or schedule occupies all available memory.

  Possible Causes: Too many complex methods or schedules have been saved.

  Actions: To free memory for future use, delete a method or schedule that is no longer used.

- **[250] DSP does not acknowledge.**

  The DSP (digital signal processor) did not respond to a command from the CPU.

  Possible Causes: Communication problem between the DSP and the CPU.

  Actions:

  - Turn the power off and then back on.

  - If the error message appears again, contact Dionex.

- **[331] Method does not exist.**

  The schedule contains a method that does not exist.

  Possible Causes: Incorrect method number entered into the schedule.

  Actions:

  - Enter the method number of an existing method in the schedule.

  - Create a new method and save it to the method number indicated in the schedule.

- **[348]** **A failure has occurred during power up! The status of all tests run during power up are indicated on the Diagnostic Tests screen which follows this error message.**

  At power up, the AS50 electronics are tested. If one or more tests fails, this message appears. On the **DIAGNOSTIC TESTS** screen, an "F" indicates that a test failed and a "P" indicates it passed.

  Possible Causes: One or more of these tests has failed, indicating a problem with that portion of the electronics.

  Actions:

  - See Section C.9.2 for a description of each test.
  - If the **SYRINGE COMM** test failed, make sure the sample syringe cable is installed and connected to the correct connector on the AS50 rear panel (see Section B.3.3). If the prep syringe is installed, check its cable connection, also. Rerun the test.
  - If the test still fails, contact Dionex.

- **[375]** **An attempt was made to use the sample prep syringe. This option is not installed.**

  Two of the method sample prep operations (**DISPENSE** and **DILUTE**) can be used only when the sample preparation option is installed. See Section 3.10.3 for details.

  Possible Causes: A **DISPENSE** or **DILUTE** operation was specified in the sample prep steps of the current method, although the sample preparation option is not installed.

  Actions:

  - Remove the step(s) requiring the sample preparation option.
  - Select a method that does not require the sample preparation option.

- **[376] Time-out occurred waiting for syringe to complete an action.**

   Every syringe action is assigned a maximum time in which the action should be completed. The syringe did not complete its task in the allotted time, indicating either a mechanical or a communication problem.

   Possible Causes:

   - Faulty syringe
   - Faulty cable

   Actions:

   - Check the syringe motion. If the syringe action is faulty, the syringe may need to be replaced (see Section 5.11).
   - If the syringe does not move in response to a command, the cable may need to be replaced. Contact Dionex.

- **[377] Time-out occurred waiting for syringe serial port txrdy.**

   Possible Causes:

   - Blocked syringe lines
   - Faulty syringe
   - Faulty cable

   Actions:

   - Check the lines to the syringe for crimps or other blockages. Replace the lines, if necessary (see Section 5.1).
   - Check the syringe motion. If the syringe action is faulty, the syringe may need to be replaced (see Section 5.11).
   - If the syringe does not move in response to a command, the cable may need to be replaced. Contact Dionex.

- **[378]** **Time-out occurred waiting for syringe to respond to command.**

  Possible Causes: Communication problem.

  Actions: Turn off the AS50 power, check the syringe cable connections, and then turn on the power again. If the message reappears, contact Dionex.

- **[380]** **Response from syringe was too long. Receive buffer overflowed.**

  Possible Causes: Communication problem.

  Actions: Turn off the AS50 power and then turn on the power again. If the message reappears, contact Dionex.

- **[381]** **An attempt was made to move the syringe to an illegal position. Most likely, the specified volume was larger than the remaining syringe capacity.**

  Valid positions for the syringes are programmed into the AS50 instrument control Moduleware. There was an internal instruction to move a syringe to a position that was not programmed.

  Possible Causes: Problem with the Moduleware.

  Actions: Turn off the AS50 power and then turn on the power again. If the message reappears, contact Dionex.

- **[382]** **An attempt was made to move a syringe valve to an illegal position.**

  Valid positions for the syringe valves are programmed into the AS50 instrument control Moduleware. There was an internal instruction to move a syringe valve to a position that was not programmed.

  Possible Causes: Problem with the Moduleware.

  Actions: Contact Dionex.

- **[383]** **An attempt was made to set the syringe speed to an illegal value.**

   Valid speeds for the syringes are programmed into the AS50 instrument control Moduleware. There was an internal instruction to move a syringe at a speed that was not programmed.

   Possible Causes: Problem with the Moduleware.

   Actions: Contact Dionex.

- **[384]** **Cannot use sample syringe to aspirate from specified source reservoir.**

   Possible Causes: The sample syringe can aspirate only from the flush reservoir or from the sampling needle.

   Actions: Select a different source for the aspirate function or select the prep syringe (if installed).

- **[386]** **Operation could not be completed because vial tray is not installed.**

   Magnets on the vial trays indicate to a magnetic sensor in the autosampler compartment when a tray is installed (and the type of tray).

   Possible Causes: (assuming a tray is installed, but is not recognized by the sensor)

   - Tray magnets are missing or incorrectly installed.
   - Sensors are not working.

   Actions:

   - Replace the tray.
   - Replace the tray sensor card. Contact Dionex.

- **[387]   An illegal vial number was specified.**

    The type of tray installed determines which vial numbers can be used in methods and schedules.

Tray Type	Tray Capacity
1.5 mL, aluminum	100 vials (1.5 or 0.3 mL)
10 mL, plastic	49 PolyVials

    Possible Causes: The vial number specified in the method sample prep steps or the schedule steps is not available for the type of tray installed in the autosampler compartment.

    Actions:

    - Use a tray type that accommodates the specified vial.

    - Change the vial specified in the method or schedule.

- **[388]   A NAK command was received from the DSP.**

    The CPU sent a command to the DSP which the DSP cannot execute.

    Possible Causes: An installed option is not being recognized.

    Actions:

    - Check the **INSTALLED OPTIONS** screen (see Section C.6.1) to verify that all optional features are being recognized. A check mark should appear beside each installed option.

    - If an installed option is not checked, turn off the power and then turn on the power and recheck the **INSTALLED OPTIONS** screen. If the problem persists, contact Dionex.

- **[389]** **Timed out waiting for motion complete command from DSP.**

    The DSP could not complete a motion in the time allowed.

    Possible Causes:

    - Mechanical problem with the autosampler needle arm

    - A valve is not being actuated

    Actions:

    - Check for an obstruction in the autosampler compartment.

    - Manually test the autosampler needle arm movement, using the **XYZ TEST** screen (see Section C.9.3).

    - Manually test the sample syringe, the sample prep syringe, and the injection valve(s), using the **LIQUID CONTROL** screen (see Section C.9.5).

    - If the problem persists, contact Dionex.

- **[390]** **Received invalid command from DSP.**

    Possible Causes: Communication between the CPU and the DSP was corrupted.

    Actions: Turn off the power and then turn on the power again. If the message reappears, contact Dionex.

- **[391]** **Schedule error. Specified schedule does not exist.**

    Possible Causes: The schedule selected to run has not been saved.

    Actions: Create the new schedule or select an existing schedule.

- **[398]** **Battery backed up RAM failed data validation test. Setting system parameters to defaults and initializing schedule and method database.**

  Possible Causes:

  - Temporary short on CPU board

  - Dead battery on CPU board

  - Malfunctioning power supply

  Actions: If a temporary short is suspected, the AS50 can still be operated. You will need to re-enter any method and schedule information and customized system setup parameters. If the problem persists, contact Dionex.

- **[408]** **Recoverable motion error occurred in X-axis**

  Possible Causes: An error occurred during X-axis movement of the sampling arm. The DSP was able to recover from the error and continue the motion.

  Actions: Occasional occurrences of this error can be ignored. If the problem persists, contact Dionex.

- **[409]** **Non-recoverable motion error occurred in X-axis. Clear any physical obstructions and then press any key to reset system.**

  Possible Causes: An error occurred during X-axis movement of the sampling arm. The DSP was not able to recover from the error.

  Actions:

  1. Turn off the power.

  2. Check for an obstruction in the autosampler compartment.

  3. Check for freedom of movement in all three axes of the sampling arm.

  4. Turn on the power again. If the problem persists, contact Dionex.

- **[414] Specified volume is larger than size of sample syringe.**

  During normal operation (not during diagnostics), the syringe can perform up to four multiple strokes to aspirate or dispense a volume up to four times larger than the syringe size.

  Possible Causes:

  - During a schedule or flush/prime operation, the specified volume is more than four times the size of the sample syringe.

  - On the **LIQUID CONTROL** diagnostics screen, either the specified volume exceeds the size of the sample syringe or the cumulative volume (when performing multiple actions) exceeds the size of the syringe.

  Actions:

  - Reduce the volume specified or, if the sample preparation option is installed, use the prep syringe (not the sample syringe) for certain operations. See "Sample Preparation Option Functions" on page 2-9 for details.

  - On the **LIQUID CONTROL** screen, select a different operation or reduce the volume specified.

- **[415] Cycle time expired before INIT step was completed.**

  When the cycle time expires, the AS50 ignores the cycle time and delays injection until the **INIT** step is complete. See Section 2.6.5 for details.

  Possible Causes: The selected cycle time was too short.

  Actions: Select a longer cycle time (see Section 3.10.4).

- **[418]** **DSP not able to home XYZ motor arm**

  Possible Causes:

  - Physical blockage of the sampling arm

  - DSP malfunction

  Actions:

  1. Turn off the power.

  2. Check for an obstruction in the autosampler compartment.

  3. Check for freedom of movement in all three axes of the sampling arm.

  4. Turn on the power again. If the problem persists, contact Dionex.

- **[421]** **Timed events step took so long to execute that at least one subsequent step was missed.**

  Possible Causes:

  - Insufficient time allowed for loading the sample loop

  Actions:

  - On the method's **TIMED EVENTS** screen, set the injection valve to the load position in the **INIT** step (the default).

  - If the valve is not set to load in the **INIT** step, be sure to allow enough time between the **LOAD** and the **INJECT** parameters for the loop to be completely loaded. The time needed depends on the sample syringe volume and the selected syringe speed (see Section 3.13).

- **[429]** **Format of global database has changed. Reinitializing to default values.**

  Possible Causes:

  - Dead battery on CPU board

  - Malfunctioning power supply

  Actions: Contact Dionex.

- **[430] Format of method/schedule database has changed. Reinitializing to default values.**

    Possible Causes:

    - Dead battery on CPU board

    - Malfunctioning power supply

    Actions: Contact Dionex.

- **[431] Format of calibration database has changed. Reinitializing to default values.**

    Possible Causes:

    - Dead battery on CPU board

    - Malfunctioning power supply

    Actions: Contact Dionex.

- **[438] Timed out waiting for home position to be found.**

    Possible Causes:

    - Autosampler compartment door open at power-up

    - DSP malfunction

    - Sampling arm malfunction

    Actions:

    - Close the autosampler compartment door and then press the **Home** button.

    - If closing the door does not eliminate the problem, try turning the power off and then on again. If the problem persists, contact Dionex.

- **[439] Method/Schedule database has been corrupted. Reinitializing database.**

  Possible Causes:

  - Dead battery on CPU board

  - Malfunctioning power supply

  Actions: Contact Dionex.

- **[441] Sampler door opened.**

  Possible Causes:

  - Autosampler compartment door accidentally opened.

  - Door not closing properly

  - Door sensor malfunction

  - Door magnet missing

  Actions:

  - The autosampler door must be closed to operate the AS50. Close the door and restart the schedule, if necessary.

  - If the door appears closed, but the message still occurs, check for an obstruction that is preventing the door from closing completely.

  - Make sure the magnet on the inside lower front edge of the door is present. Also make sure the magnet on the lower edge of the autosampler compartment is present. If a magnet is missing, contact Dionex.

- **[443]   Leak detected in tray/syringe area.**

  Possible Causes:

  - Excess liquid in the waste container is preventing liquid from siphoning through the waste tubing

  - Blocked or crimped waste tubing

  - Leaking inject port

  - Miscalibrated leak sensor

  Actions:

  - Empty the waste container.

  - Make sure the waste tubing is not crimped and that it is not pushed against the bottom of the waste container.

  - If the inject port is leaking, see Section 4.2.3.

  - If the tray is dry, but the error is still appearing, recalibrate the sensor (see Section 5.10).

- **[445] Invalid leak sensor reading. May be open- or short-circuit, or bad sensor. See Leak Sensor Calibration screen for more information.**

  Actions: The leak sensor card, the cables, or the sensor must be replaced. Contact Dionex.

- **[446] Current leak sensor voltage is outside of legal calibration range.**

  Attempting to calibrate when the leak sensor voltage reading is outside the normal dry range.

  Possible Causes: The sensor is not dry enough for calibration.

  Actions: Clean and dry the area thoroughly and recalibrate (see Section 5.10).

- **[447] Leak sensor needs recalibration. Go to Leak Sensor Calibration screen to perform recalibration operation.**

  Actions: See Section 5.10 for calibration instructions.

- **[448] Motion command to DSP was aborted. Needle may not have homed properly.**

  Possible Causes: Loose coupling in the Z-axis. The needle does not stay up.

  Actions: Try the motion again. If the problem persists, contact Dionex.

- **[449] Recoverable motion error occurred in Y-axis.**

  Possible Causes: An error occurred during Y-axis movement of the sampling arm. The DSP was able to recover from the error and continue the motion.

  Actions: Occasional occurrences of this error can be ignored. If the problem persists, contact Dionex.

- **[450] Non-recoverable motion error occurred in Y-axis. Clear any physical obstructions and then press any key to reset system.**

  Possible Causes:

  - Vial obstructing motion
  - Misaligned sampling needle arm

  Actions:

  - Remove the vial obstruction.
  - Align the sampling needle arm in the inject port (see Section 5.7).
  - Turn off the power and check for freedom of movement of all three axes of the sampling arm.

- **[451] Recoverable motion error occurred in Z-axis.**

  Possible Causes: An error occurred during Z-axis movement of the sampling arm. The DSP was able to recover from the error and continue the motion.

  Actions: Occasional occurrences of this error can be ignored. If the problem persists, contact Dionex.

- **[452]** **Non-recoverable motion error occurred in Z-axis. Clear any physical obstructions and then press any key to reset system.**

  Possible Causes:

  - Vial obstructing motion
  - Bent sampling needle
  - Misaligned sampling needle arm
  - Incorrect X-Y position (not over a vial)

  Actions:

  - Remove the vial obstruction.
  - If the needle is bent, replace the sampling needle assembly (see Section 5.3).
  - Align the sampling needle arm in the inject port (see Section 5.7).
  - Turn off the power and check for freedom of movement of all three axes of the sampling arm.
  - Contact Dionex.

- **[453]** **Recoverable motion error occurred in inject valve.**

  Possible Causes:

  - Valve in wrong position

  Actions: Turn off the power and then turn on the power again. If the message reappears, contact Dionex.

- **[454]** **Non-recoverable motion error occurred in inject valve. Clear any physical obstructions and then press any key to reset system.**

  Possible Causes: Valve in wrong position

  Actions: Turn off the power and then turn on the power again. If the message reappears, contact Dionex.

- **[455]   Recoverable motion error occurred in auxiliary valve.**

    Possible Causes: Valve in wrong position

    Actions: Turn off the power and then turn on the power again. If the message reappears, contact Dionex.

- **[457]-[474]   Syringe reports fatal error:**
  Syringe reports error:

    Possible Causes: Syringe errors can result from various mechanical problems or from a communication failure between the syringe and the AS50 electronics.

    Actions:

    - Check the syringe cable connections.

    - For fatal errors, press a key to reset the system.

    - If the error persists, contact Dionex.

- **[475]   Cannot run schedule. No DSP detected.**

    Possible Causes: Electronic malfunction

    Actions: Turn off the power and then turn on the power again. If the message reappears, contact Dionex.

- **[476]** **Cannot run schedule. No sample syringe detected.**

  Possible Causes:

  - Syringe cable not plugged into the rear of the AS50

  - Faulty syringe cable or syringe

  Actions:

  - Check the syringe cable connection.

  - Replace the cable. Contact Dionex.

- **[479]** **Non-recoverable error. Both internal and external inject valves are connected. Please, power down and disconnect one inject valve before continuing.**

  Possible Causes: An injection valve is installed in both the autosampler compartment and in another module.

  Actions: Disconnect one of the valves.

- **[480]** **Timed out waiting for tray temperature to stabilize. Either temperature control is broken, or set temperature is too far away from ambient.**

  The sample temperature control option was not able to reach the temperature set point within the time allotted.

  Possible Causes:

  - Ambient temperature too high or low

  - Airflow to cool the Peltier devices is restricted

  - Malfunction of the sample temperature control option

  Actions:

  - Go to the **TEMPERATURE STATISTICS** screen (press **Menu**, **8**, and **4**) and check the following parameters under **TRAY SET TEMP**:

    PELTIER: The Peltier value should be above zero. If it is not, contact Dionex.

    DUTY CYCLE: A value of 255 means the sample temperature control unit is working to capacity. The ambient temperature may be too high or too low, or the airflow to the Peltier device may be restricted.

  - Select a temperature that is closer to ambient. If possible, adjust the ambient temperature before running the AS50.

  - Check the fan intake under the AS50 and the fan exhaust in the back for any obstructions restricting airflow. Make sure there is at least 6 cm (2.5 in) free space behind the AS50 for ventilation.

  - If the problem persists, contact Dionex.

4.2   Liquid Leaks

4.2.1   Leaking Syringe or Syringe Valve Port

Possible Causes:

- Cracked syringe

- Missing or worn Teflon® washer in the leaking valve port

- Loose syringe

Actions:

- Check for a crack in the syringe. Replace the syringe, if necessary (see Section 5.11).

- If the leak is from one of the valve ports, remove the valve and syringe (see Section 5.11). Remove the existing white Teflon washer from inside the valve port and replace it with a new washer (P/N 061315). The washers are supplied with the syringe valve and with the AS50 Preventive Maintenance Kit. Reinstall the syringe and valve.

- Make sure the syringe is tightened. To tighten, hold the syringe at the top and bottom fittings and turn it clockwise (as viewed from the top) (see Figure 4-1). Tighten fingertight only; do not overtighten.
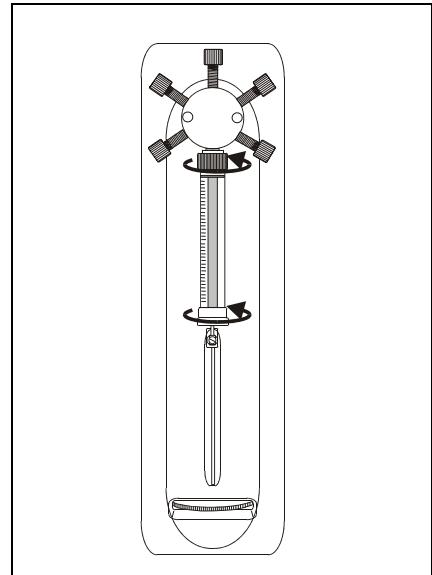
Figure 4-1. Tightening the Syringe

4.2.2 Leaking Drain Line Connection

- Make sure the drain line is not crimped or otherwise blocked.

- Make sure the line is not submerged in liquid in the waste container. Empty the container, if needed.

- For autosamplers without sample temperature control, make sure the line is pushed tightly onto the drip tray fitting and that it is not elevated at any point after it exits the autosampler.

- For autosamplers with sample temperature control,

4.2.3 Leaking Inject Port

Check for a leaking fitting and tighten. Check for a damaged or worn needle seal. Replace the needle seal assembly, if necessary (see Section 5.6).

If fluid appears on the top of the inject port during injection, the needle may not be reaching the correct depth in the port or may not be aligned over the inject port. Try aligning the inject port (see Section 5.7).

4.2.4 Leaking Fitting

Locate the source of the leak. Tighten or replace the liquid line connection (see Section 5.1). Refer to *Installation of Dionex Ferrule Fittings* for tightening requirements.

4.2.5 Broken Liquid Line

Replace the line and fittings (see Section 5.1).

5 • Service

This chapter describes AS50 service and repair procedures that the user can perform. All procedures not included here, including electronics-related repair procedures, must be performed by Dionex personnel. For assistance, contact Dionex Technical Support. In the U.S., call 1-800-346-6390. Outside the U.S., call the nearest Dionex office.

Before replacing any parts, refer to the troubleshooting information in Chapter 4 to isolate the cause of the problem.

The CPU card contains a lithium battery. If the CPU card is replaced, dispose of the used battery according to the manufacturer's instructions.

IMPORTANT **Substituting non-Dionex parts may impair AS50 performance, thereby voiding the product warranty. Refer to the warranty statement in the Dionex Terms and Conditions for more information.**

5.1 Replacing Tubing and Fittings

The following tables list the tubing, fittings, and tubing assemblies used to plumb the AS50 autosampler compartment.

5.1.1 Syringe and Reservoir Connections

Part Number	Description	Used For
052112	PFA tubing: 1.55-mm (0.062-in) ID	Connecting the flush
048949	1/8-in flangeless ferrule fitting	reservoir to the sample
052267	1/4-28 flangeless nut	syringe valve

5.1.2 Assemblies, Tubing, and Fittings

Part Number	Description	Used For
057301	Needle seal assembly, 18-in	Connecting the AS50 inject
061290	Needle seal assembly, 18-in (for the simultaneous injection option)	port to the injection valve
054271	Sampling needle assembly, 2 mL	Connecting the sampling
061267	Sampling needle assembly 2 mL (for the simultaneous injection option)	needle arm to the sampling valve
044777	PEEK tubing: 0.75-mm (0.030-in) ID	Connecting the injection valve
043276	Double-cone ferrule fitting	port 6 (waste) to the AS50 drip
043275	10-32 double-cone bolt	tray
042857	Sample loop, 25 μL	Connecting ports 1 and 4 on the injection valves (if installed)

5.2 Replacing the Sample or Prep Syringe

The table below lists part numbers for the available syringe sizes.

Syringe Type	Syringe Size	Part Number
Sample	100 μL	055064
	250 μL	053916
	500 μL	055065
	1000 μL	055066
	5 mL*	053915
	10 mL*	055068
Prep	2.5 mL	055067
	5 mL	053915
	10 mL	055068

*A 5 or 10 mL syringe is required for the simultaneous injection option.

5.2.1   Removing The Existing Syringe

1. Using a flathead screwdriver, unscrew and remove the syringe drive connecting screw (see Figure 5-1).

2. Hold the syringe at the top and bottom and unscrew it from the valve.

3. Remove the white Teflon washer from the syringe valve port. **Note:** To remove the washer, push a piece of 0.8-mm (0.031-in) OD PEEK tubing into the center of the washer and twist sideways to dislodge the washer.

4. Install a new white Teflon washer (P/N 061315) into the new syringe.

Syringe Drive
Connecting
Screw (Remove)
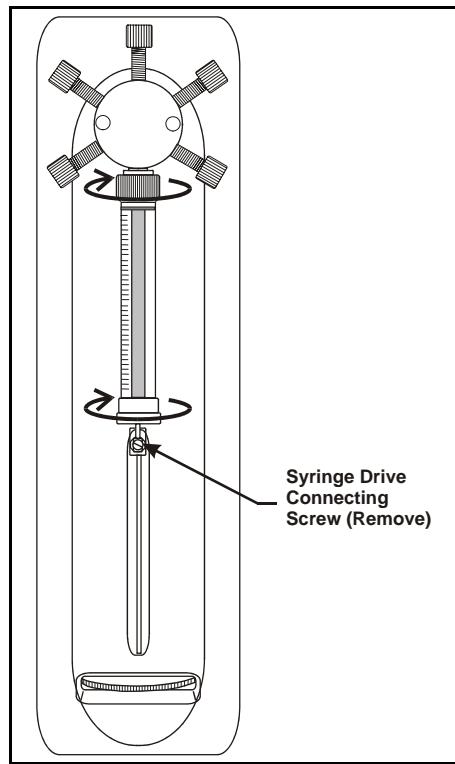
Figure 5-1. Removing the Syringe

5.2.2   Filling the New Syringe and Removing Bubbles

1. Fill a container with isopropyl alcohol. Place the threaded end of the syringe into the container and slowly pull liquid into the syringe.

2. Remove the syringe from the liquid and point the threaded end up into the air. If air bubbles are present, push the syringe plunger up and pull down rapidly with short movements to dislodge the bubbles. Repeat until all bubbles are dislodged.

3. Place the threaded end of the syringe into the isopropyl alcohol again and draw a full syringe volume up by slowly pulling out the plunger.

4. Keep the syringe in the liquid and slowly push the syringe plunger until the bubbles exit the syringe. Then, fill the syringe completely.

5. Remove the syringe from the liquid. While holding it vertically, push a small amount of liquid out the top to make sure no air remains.

5.2.3 Connecting the New Syringe and Flushing

1. Position the syringe under the valve.

2. Holding the syringe at the top and bottom, screw it back into the valve and tighten fingertight.

3. Align the syringe piston with the connecting screw mount on the syringe drive.

4. Insert the syringe drive connecting screw removed in Section 5.2.1 and tighten fingertight.

5. Perform a flush cycle:

   a. Press **Menu**, **Menu**, and **6** to go to the **FLUSH/PRIME** screen.

   b. Move the cursor to the **ACTION** field and press **Select** Δ or **Select** ∇ to select **FLUSH**. Press **Enter**.

6. Check the syringe for bubbles. If any exist, remove the syringe and remove the bubbles (see Section 5.2.2). Reconnect the syringe and flush again.

5.2.4 Initializing the Syringe

1. From the **MENU of SCREENS**, press **5** and **3** to go to the **PLUMBING CONFIGURATION** screen.

```
              PLUMBING CONFIGURATION
                   INJECT VALVE:  PEEK
                      LOOP SIZE:   25   uL
         SAMPLE SYRINGE VOLUME:   250  uL
          SAMPLE SYRINGE CONFIG:  READY
            PREP SYRINGE VOLUME:  2.5   mL
            PREP SYRINGE CONFIG:  READY
 Help Prompt
```
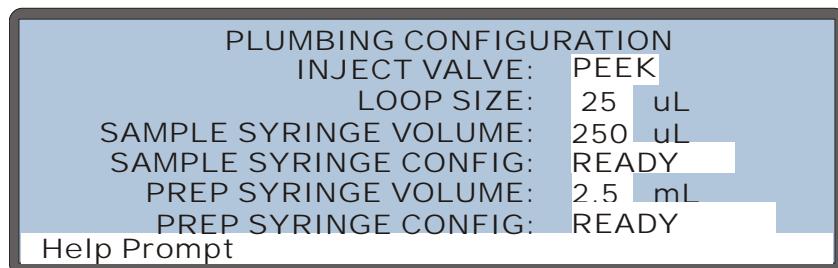
Figure 5-2. Plumbing Configuration Screen

2. Move the cursor to the **SAMPLE SYRINGE CONFIG** field or the **PREP SYRINGE CONFIG** field (depending on which syringe is to be removed).

3. Press **Select** Δ to select the **INITIALIZE** option.

4. Press **Enter**.

5. The syringe plunger moves down a small amount. This is its initial position (see Figure 5-3, View A).
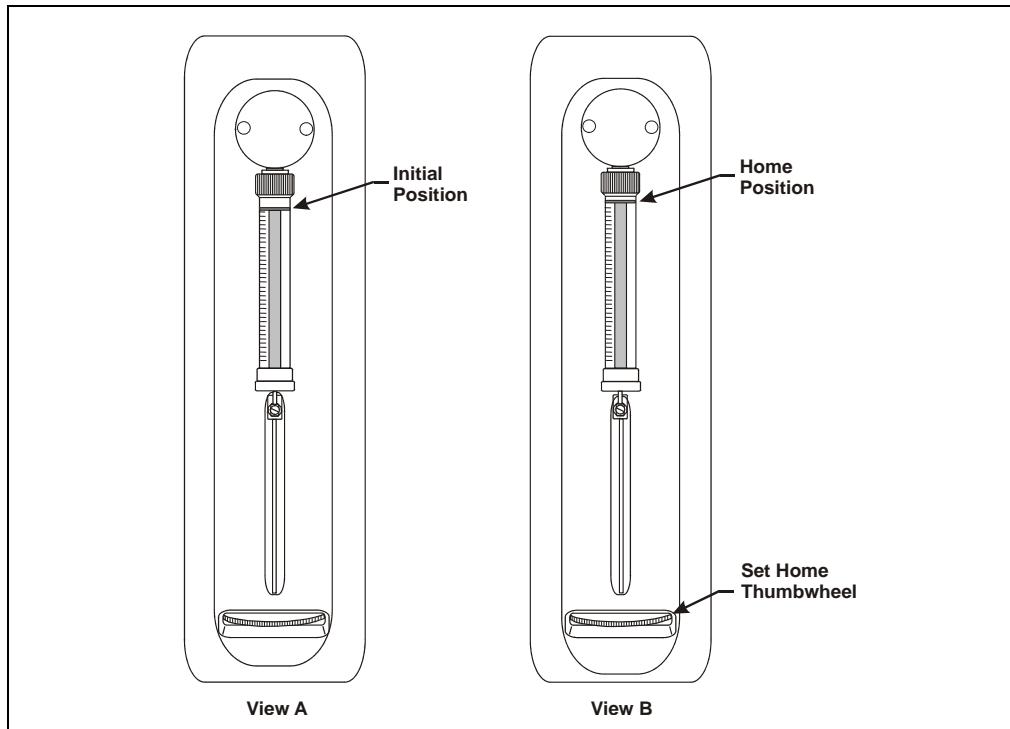
Figure 5-3. Initializing the Syringe and Setting the Home Position

5.2.5   Setting the Syringe Home Position

1. Move the set home thumbwheel to the left to raise the syringe plunger until it is approximately 1 to 2 mm from the top of the syringe (see , View B).

   When the syringe is in operation, this set position will be the uppermost stopping point for the syringe plunger.

2. Move the cursor to the **SAMPLE SYRINGE CONFIG** field or the **PREP SYRINGE CONFIG** field on the **PLUMBING CONFIGURATION** screen. Press **Select** ∇ to select the **SET HOME** position.

3. Press **Enter**.

   The syringe moves down to the initial position and then back up to the home position.

5.3 Replacing the Sampling Needle Assembly

5.3.1 Removing the Old Sampling Needle Assembly

1. Press **Menu**, **8**, and **5** to go to the **LIQUID CONTROL** screen.

2. With the cursor in the **VIAL#** field, press **Select** ∇ to select **FLU** and press **Enter**.

   The needle arm moves to the flush port.

3. Turn off the power and open the autosampler door.

4. The sample transfer line tubing that connects the sampling needle to the sample syringe is clipped to the upper-right side of the needle arm (see Figure 5-4). Using a 2.5-mm Allen wrench, remove the M3 screw that attaches the clip to the sampling arm. Remove the clip, and then remove the tubing from the clip.

   NOTE Some sampling arms have a clip that is open at the top. This type of clip does not need to be removed. To remove the tubing from the clip, pull the clip out slightly and push the tubing up and out of the clip.
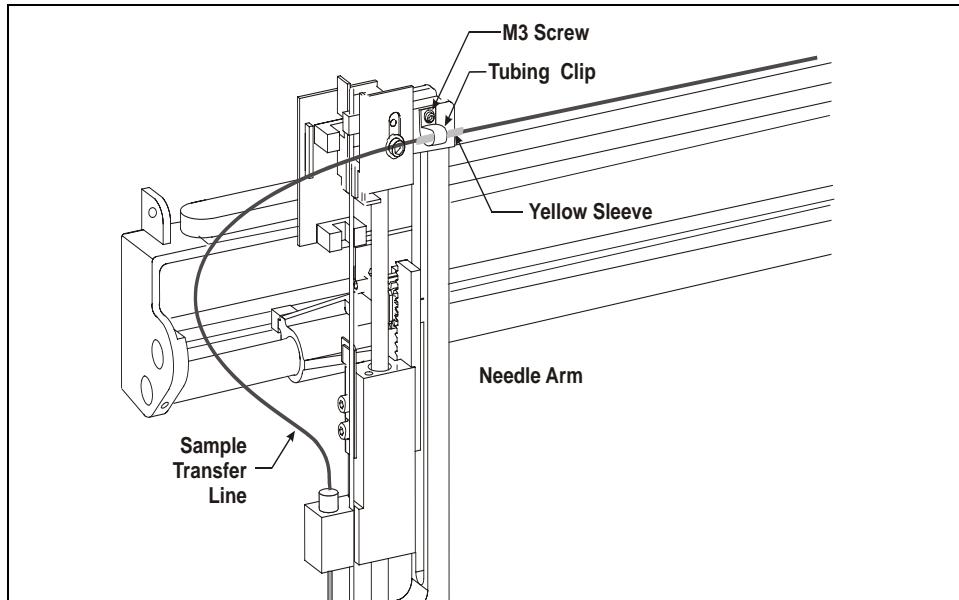
Figure 5-4. Sample Transfer Line and Tubing Clip

5. Measure the distance from the yellow sleeve on the sample transfer line (see Figure 5-4) to the needle. When installing the new sample transfer line, position the sleeve on the new line the same distance from the needle.

6. The sample transfer line is coiled and held by a bracket and clamp on the upper-right side of the autosampler compartment (see Figure 5-5). To remove the tubing, use a flathead screwdriver to gently pry the center bracket apart. Then, lift the tubing out of the bracket and clamp.

7. Measure the distance from the second yellow sleeve (see Figure 5-5) to the needle. When installing the new sample transfer line, position the sleeve on the new line the same distance from the needle.

8. Disconnect the sample transfer line from port C on the sample syringe valve.

9. Pull the ferrule fitting off the end of the tubing and remove the bolt.

10. Tape one end of a piece of string or tubing to the end of the sample transfer line. This will help you thread the new line through the autosampler later in the procedure.
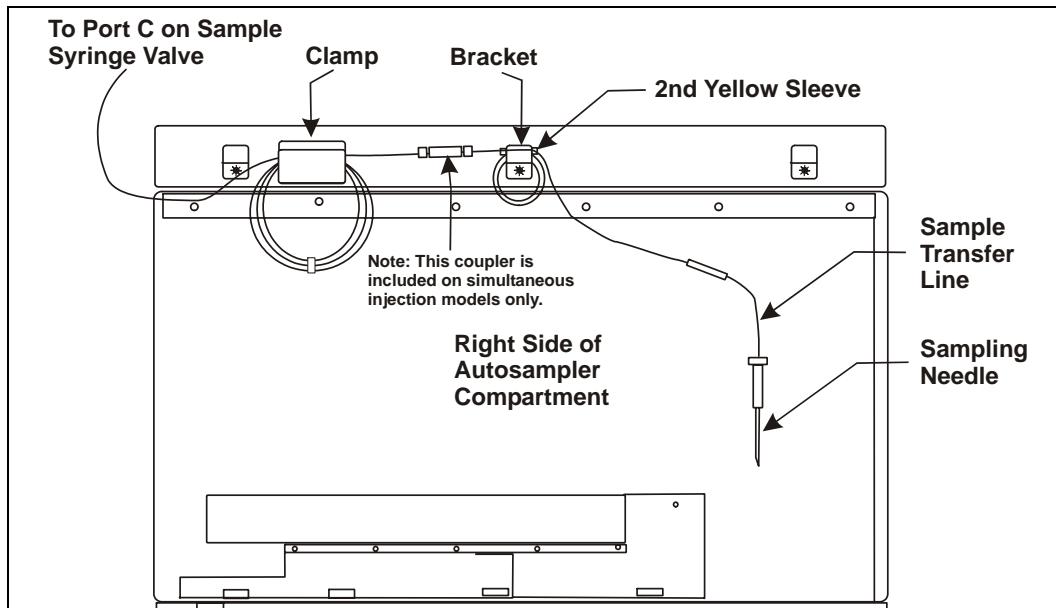
Figure 5-5. Sample Transfer Line Bracket and Clamp (Right Side of Compartment)

11. From the inside of the autosampler, pull the tubing into the autosampler compartment, along with the end of the attached string or tubing.

12. Turn the needle fitting above the needle block (see Figure 5-6) counterclockwise until it is loose.

13. Pull the needle assembly up and out of the needle block and cradle.

14. Remove the needle assembly from the autosampler.
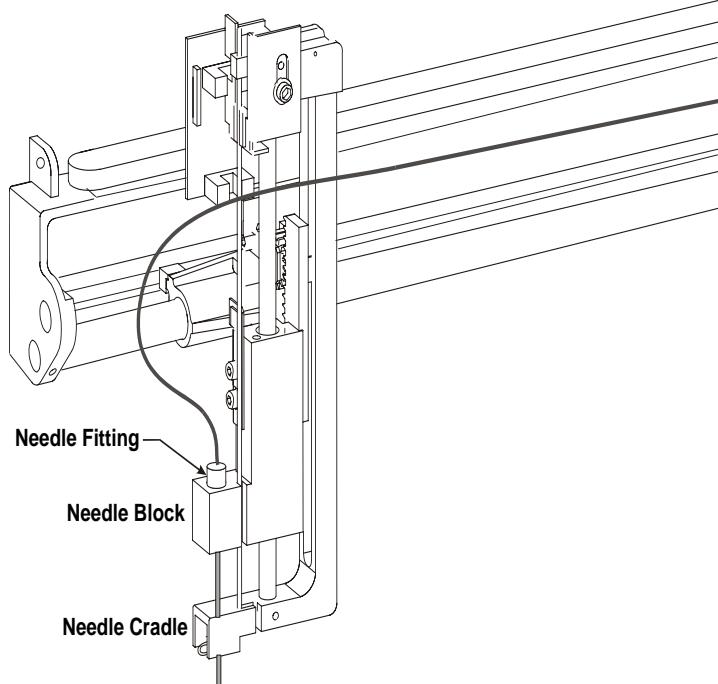
Figure 5-6. Removing the Needle from the Cradle

5.3.2   Installing the New Sampling Needle Assembly

1. Figure 5-7 illustrates the sampling needle assembly.
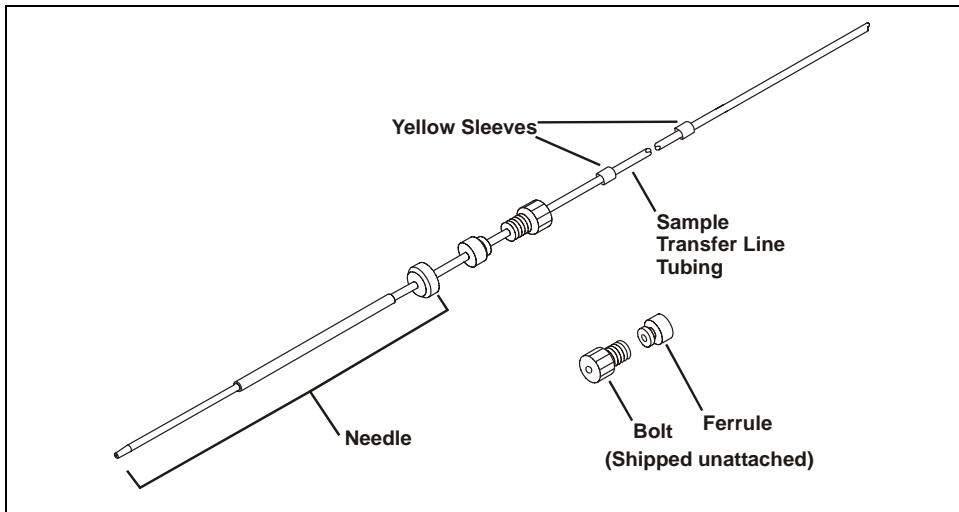
Figure 5-7. Sampling Needle Assembly

2. From the top, carefully insert the needle into the needle block (see Figure 5-8), making sure the needle is vertical and centered over the opening inside the block.
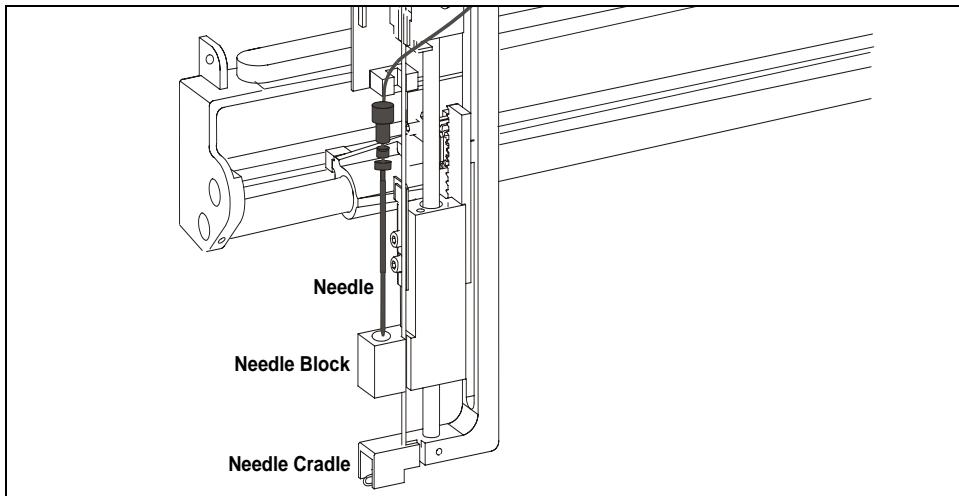
Figure 5-8. Installing the Needle in the Cradle

3. Continue inserting the needle, making sure it is lined up with the opening in the cradle. The needle stops when the fitting on the needle reaches the bottom of the needle block.

4. Insert the bolt into the needle block.

5. With one hand, hold the tubing in place above the bolt to make sure the needle remains vertical and centered in the needle block and cradle. With your other hand, tighten the bolt fingertight.

6. To check the position of the needle inside the cradle, hold the bolt above the needle block and lift the needle up all the way until it stops. Then let it back down, making sure it enters through the center of the needle block and is centered in the cradle.

7. Position the yellow sleeve on the tubing in the position measured in Section 5.3.1, Step 5. Orient the tubing clip up or down, depending on the natural curve of the tubing and attach the clip to the tubing where the yellow sleeve is attached. Screw the clip back onto the needle arm again.

IMPORTANT **Do not shorten the sample transfer line tubing. The extra length is required to prevent sample from being pulled into the syringe during operation.**

IMPORTANT **The tubing must curve away from the arm assembly when the arm is moved toward the right/front of the autosampler. Adjust the tubing length to the needle when the needle is all the way down.**

8. Close the autosampler door and turn on the power. Press **Home** to confirm the tubing moves correctly.

9. Turn off the power and open the door.

10. Position the second yellow sleeve on the tubing in the position measured in Section 5.3.1, Step 7. Loop the tubing at the second yellow sleeve and attach it to the center bracket on the upper-right side of the autosampler compartment (see Figure 5-5). Use a screwdriver to push in the bracket slightly and secure the tubing.

   NOTE **The front and back brackets on the upper-right side of the compartment are not used.**

11. Loop the remaining tubing and hang it on the rear clamp, leaving about 45 cm (18 in) free.

12. Tape the string or tubing that was pulled into the compartment in Section 5.3.1, Step 11, to the free end of the new tubing. Pull the string or tubing, along with the new tubing, out the back of the compartment.

13. Slide the bolt, large end first, onto the end of the tubing and then slide the ferrule, small end first, onto the tubing (see Figure 5-9). Slide the ferrule about 10 mm (3/8 in) past the end of the tubing.
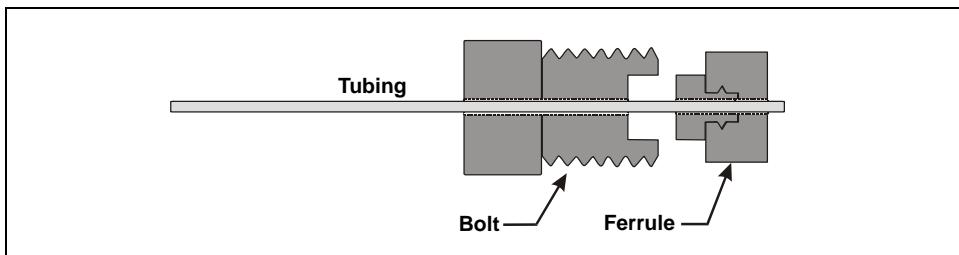
Figure 5-9. Installing the Ferrule Fitting and Bolt

14. Insert the tubing with the bolt and ferrule into port C on the sample syringe. Push the tubing snugly into the bottom of the port.

15. Close the autosampler door and turn on the power. As the arm moves to the idle position, verify there is enough slack in the sample transfer line to prevent the tubing from being pulled.

16. Turn off the power and open the door.

17. While holding the tubing with one hand to avoid twisting it, screw the bolt into the port fingertight. This seats the ferrule onto the tubing.

IMPORTANT **If the fitting leaks when operation is resumed, tighten the bolt slightly. Do not overtighten. Overtightening can damage the inside of the valve.**

18. Realign the new sampling needle in the inject port. See Section 5.7 for instructions.

5.4 Removing the Drip Tray

> **NOTE** **This section is provided as a reference when performing service procedures that require removing the drip tray.**

1. Using a 2.5-mm Allen wrench, remove the screw that secures the drip tray autosampler compartment and remove the injection valve waste line from the front of the tray (see Figure 5-10).

2. Pull out the tray (toward the front of the autosampler) about 6 mm (1/4 in).

3. Tilt the bottom of the tray out slightly and push the tray down slightly until the leak sensor on the inside of the tray (see Figure 5-10) clears the overhang on the front of the autosampler.

4. Pull the tray out of the autosampler.

5. The leak sensor is hooked onto the tray and its cable is connected inside the autosampler. To remove the drip tray completely from the autosampler, unhook the leak sensor from the tray.
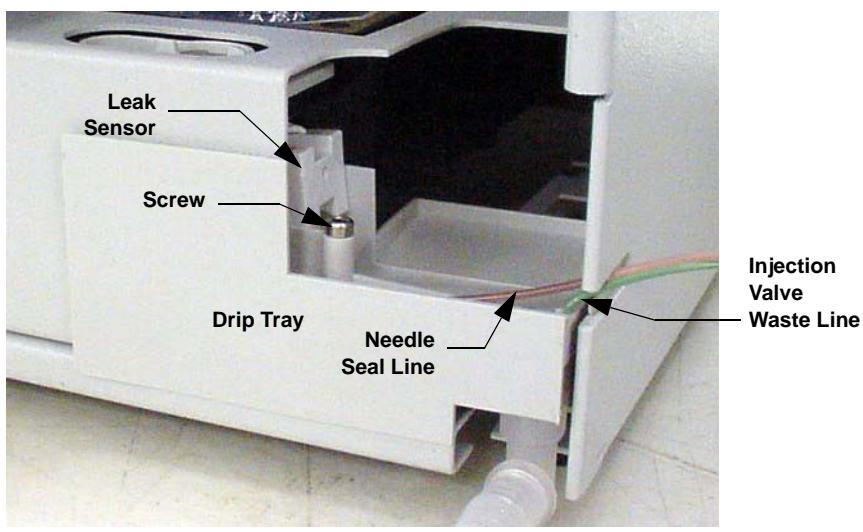
Figure 5-10. Removing the Drip Tray

5.5   Installing the Drip Tray

> **NOTE**   **This section is provided as a reference when performing service procedures that require removing and reinstalling the drip tray.**

1. Hook the leak sensor on the tray as shown in Figure 5-11; make sure it is pushed all the way down onto the tray edge.
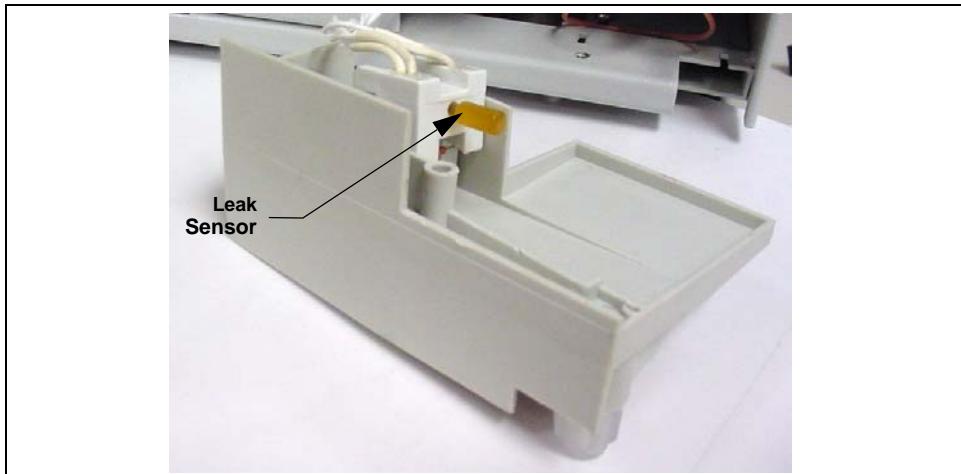
Figure 5-11. Drip Tray with Leak Sensor Installed

> **NOTE**   **Make sure the bottom wire on the leak sensor is not touching the tray. There should be at least a paper-width gap between it and the tray.**

2. Tilt the top of the tray in and the bottom out, and partially slide the tray back into the autosampler; make sure the leak sensor clears the front overhang on the autosampler.

3. Make sure the needle seal line is in the front of the tray (see Figure 5-10).

4. Straighten the tray and push it back into the autosampler until it is flush with the front. Replace the screw.

> **NOTE**   **After installing the drip tray, make sure the tray is not tilted to the left; if it is, liquid will not drain properly during operation.**

5. Insert the injection valve waste line into the small round opening at the right front corner of the drip tray (see Figure 5-12).

6. Route the needle seal line out the autosampler right side slot.

Route the needle seal line to the injection valve in the IC system

Insert the waste line from the IC system's injection valve here
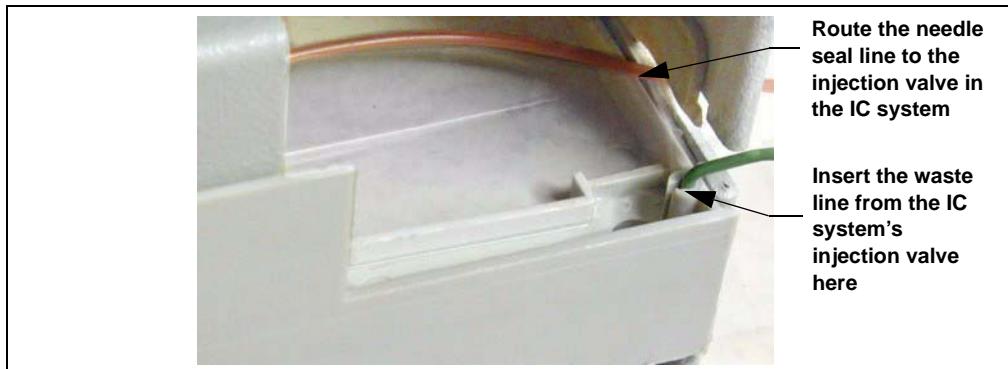
Figure 5-12. Routing the Injection Valve Waste Line to the Drip Tray:
Valve Installed in Another Module

To connect the waste line when two valves are installed in the AS50 autosampler compartment (for simultaneous injections):

1. Insert the waste line from the bottom injection valve into the small round opening at the right front corner of the drip tray.

2. Insert the waste line from the top injection valve into the larger drain line opening (see Figure 5-13).

Insert the waste line from the bottom injection valve here

Insert the waste line from the top injection valve here

Figure 5-13. Injection Valve Waste Line Connections for Dual Valves

5.6   Replacing the Needle Seal Assembly

1. Remove the drip tray (see Section 5.4).

2. Disconnect the needle seal line fitting from port S (5) on the injection valve. Using a 5/16-in wrench, turn the fitting counterclockwise to loosen it and then complete the removal with your fingers.

If the AS50 is equipped with the simultaneous injection option, disconnect the needle seal line from the Y-connector in the autosampler compartment (see Figure 5-14).
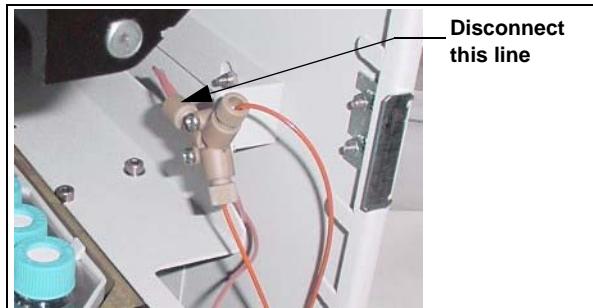
Figure 5-14. Simultaneous Injection Option: Disconnecting the Needle Seal Line

3. Rotate the fitting below the inject port until the slots in the needle seal align with the projections on the top of the inject port (see Figure 5-15).
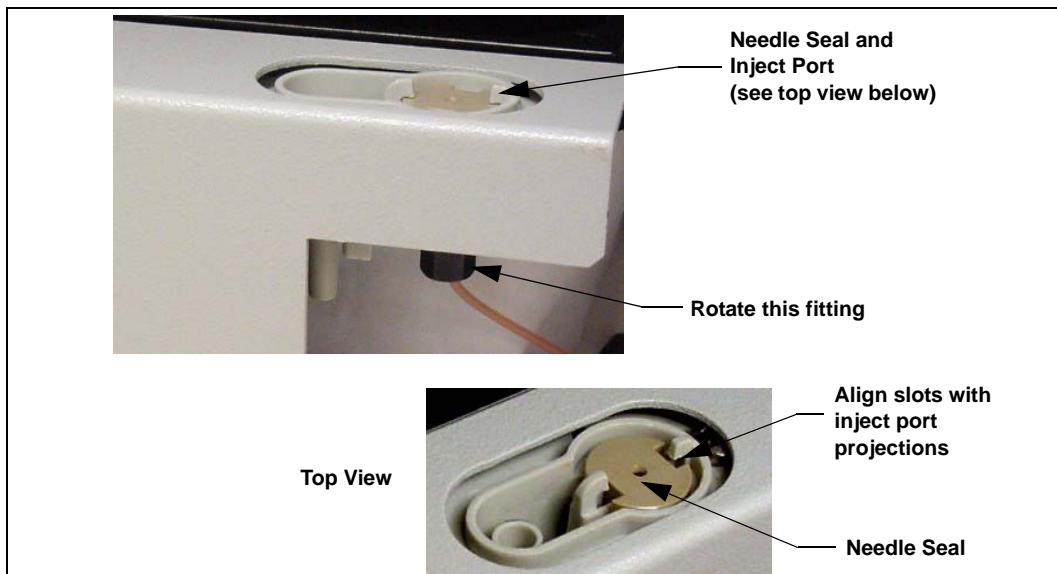
Figure 5-15. Removing the Needle Seal Assembly

4. Push up from underneath and slide the entire needle seal assembly up and out of the inject port.

5. Remove the ferrule and bolt fitting from the end of the needle seal line. Save the fitting.

> **IMPORTANT**   **Do not cut the needle seal line to shorten it, and do not replace it with a different line. The needle seal line is specially constructed and the autosampler will not function correctly if this line is cut.**

6. Thread the new needle seal line (see Figure 5-16) down through the top of the inject port.

Needle Seal Line (18-in PEEK version shown)

Needle Seal Line
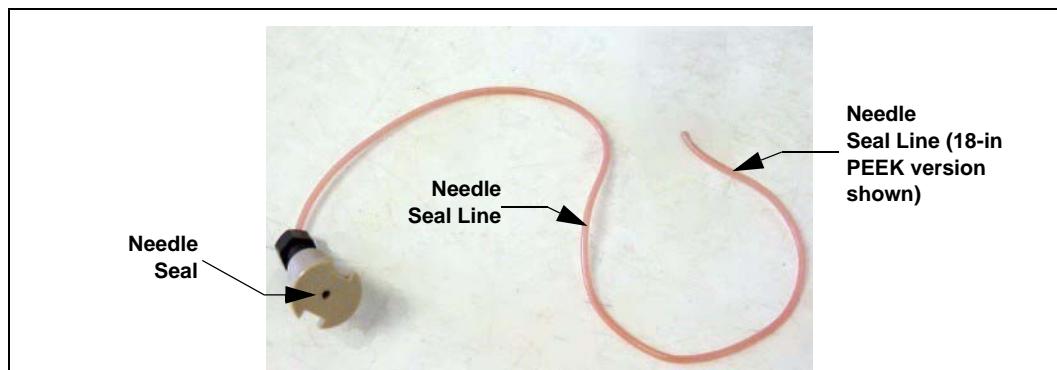
Needle Seal

Figure 5-16. Needle Seal Assembly

7. Align the slots on the needle seal with the projections on the inject port and push the needle seal into the inject port.

8. Rotate the bottom fitting until the slots are perpendicular to the projections on the inject port (see Figure 5-17).

Inject Port Projection

Slot
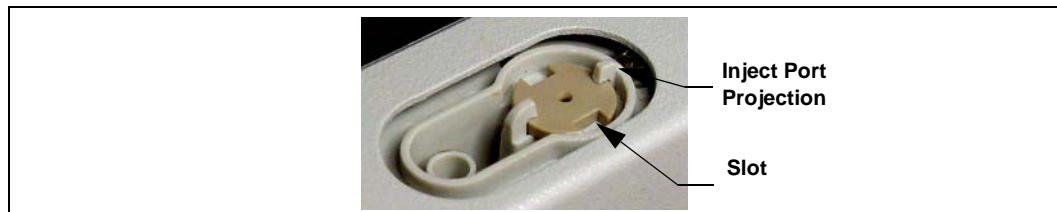
Figure 5-17. Inject Port

9. Reinstall the drip tray (see Section 5.5).

10. Align the sampling needle in the inject port (see <u>Section 5.7</u>) and then calibrate the inject port volume (see <u>Section 5.8</u>).

> **NOTE** **Do not connect the needle seal line to the injection valve until after aligning the inject port and calibrating the inject port volume.**

5.7 Aligning the Sampling Needle in the Inject Port

Align the sampling needle in the inject port after replacing the sampling needle assembly and/or the needle seal assembly, or if the needle becomes misaligned after a period of operation.

> **NOTE** **Before aligning the sampling needle in the inject port, always inspect the needle to make sure it is not bent. If the needle is bent, replace the sampling needle assembly (see <u>Section 5.3</u>).**

> **NOTE** **This procedure has numerous steps. To help maintain your place in the procedure, check off each step after completing it.**

1. Close the autosampler door and turn on the power.

2. For a better view of the needle and inject port during the alignment procedure, you can temporarily disable the door lock to allow operation with the door open.

    a. From the **MENU of SCREENS**, press **5** and then **7** to go to the **DOOR INTERLOCK BYPASS** screen.

    DOOR INTERLOCK BYPASS

    DOOR INTERLOCK BYPASS   YES

    NOTE: Afer setting bypass you have a 15 minute window to perform operations with the sample door open.

    Help Prompt
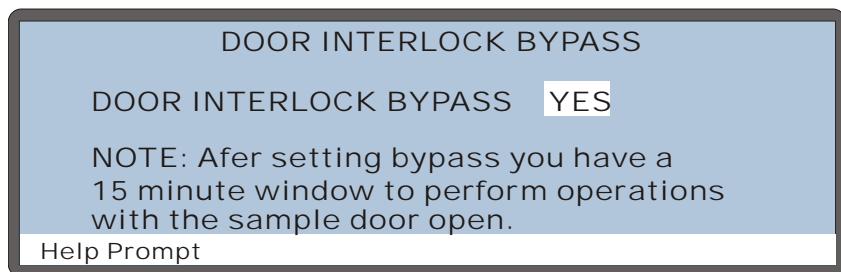
Figure 5-18. Door Interlock Bypass Screen

b. Press **Select** Δ or **Select** ∇ to select **YES** (bypass the door lock) and press **Enter**. The door lock will be disabled for 15 minutes. You can now perform the alignment with the door open. To extend the bypass for another 15 minutes, select **YES** and press **Enter** again. This restarts the 15-minute window.

Be aware of unexpected sampling arm movement when operating with the door open.

Soyez conscient de la possibilité de mouvements imprévus du bras d'échantillon lorsqu'il est utilisé avec la porte ouverte.

Achten Sie beim Betrieb mit geöffneter Tür auf unerwartete Bewegungen des Probenarms.

3. Press **Menu** and **6** to go to the **INJECT PORT ALIGNMENT** screen.

```
           INJECT PORT ALIGNMENT

    X ADDRESS:        1340
    Y ADDRESS:        1930
    Z ADDRESS:         230


 Help Prompt
```
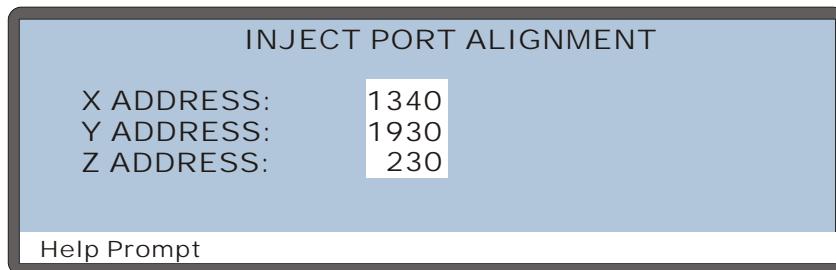
Figure 5-19. Inject Port Alignment Screen

4. Record the current values in the **X**, **Y**, and **Z ADDRESS** fields.

X _____

Y _____

Z _____

5. Verify that the cursor is in the **X ADDRESS** field and press **Enter**.

The needle arm moves to the inject port.

6. Move the cursor to the **Z ADDRESS** field and enter **180**. Press **Enter**.

The needle moves down 180 steps. Note: Each step is 0.127 mm (0.005 in).

7. Verify that the needle is centered over the inject port opening.

8. Adjust the alignment by changing the **X ADDRESS** and/or **Y ADDRESS** values. Change the values in 2- to 5-step increments.

   After each value change, press **Enter**. The needle arm moves up and then adjusts to the new X or Y position.

   - To move the needle to the right, increase the **X ADDRESS** value.
   - To move the needle to the left, decrease the **X ADDRESS** value.
   - To move the needle forward, increase the **Y ADDRESS** value.
   - To move the needle back, decrease the **Y ADDRESS** value.

9. After each adjustment, move the cursor to the **Z ADDRESS** field (keep the value at **180**) and press **Enter**. The needle arm moves back down. Observe the alignment and adjust the position again if needed.

10. When the adjustments are complete, press **Home**.

    The needle arm moves to the home position.

11. Press **Enter**.

12. Position the cursor in the **X** or **Y ADDRESS** field and press **Enter**.

    The needle arm moves to the selected X, Y position.

13. Recheck the alignment and adjust the X and/or Y position, if necessary.

14. Position the cursor in the **Z ADDRESS** field.

15. Enter the following value in the **Z ADDRESS** field: **230**.

16. Press **Enter**.

    The needle moves down into the inject port.

17. Press **Home**.

18. Press **Menu** three times to return to the **MENU of SCREENS**.

19. Press **8** to go to the **DIAGNOSTICS MENU** and press **5** to go to the **LIQUID CONTROL** screen.

20. Select **VIAL#: INJ** and press **Enter.**

    The needle moves into the inject port.

21. Position the cursor in the **FROM** field and select **FLUSH**.

22. Position the cursor in the **SYRINGE** field and select **SAMPLE.**

23. Position the cursor in the **ACTION** field and select **FILL**.

24. Press **Enter**.

    The syringe fills.

25. Select **SYRINGE SPEED: 5**. This speed ensures a fast enough flow rate to detect a leak.

26. Select **ACTION: EMPTY** and press **Enter**.

27. Repeat the **FILL** and **EMPTY** actions until the new needle seal tubing is filled.

28. Once the tubing is filled and fluid reaches the needle, empty the syringe again and monitor the top of the inject port for fluid.

    If fluid appears, first wipe up the leak, and then adjust the needle's Z position (see the next step).

29. To adjust the needle's Z position:

    a. Press **Menu**, **Menu**, **5,** and **6** to return to the **INJECTION PORT ALIGNMENT** screen.

    b. Increase the **Z ADDRESS** field value 5 steps and press **Enter**.

    c. Repeat Step 17 through 26, above, and check again for leaks.

    d. If a leak still occurs, continue increasing the Z address in 5-step increments, checking for leaks after each increase, until no more leaks occur.

        NOTE Increase the Z address only until no more leaks occur. If the Z address is too large, the needle will hit the bottom of the port during operation and can damage the needle or port.

30. When all adjustments are complete, press **Home**.

31. Factory calibration settings are recorded on a label on the inside of the autosampler compartment door. If you changed the X, Y, or Z inject port coordinates during alignment, record the new value(s) on the label.

32. If you are performing this procedure after replacing the needle seal assembly, calibrate the inject port volume (see Section 5.8).

5.8   Calibrating the Inject Port Volume

Calibrate the inject port volume after replacing the needle seal assembly, or if reproducibility between injections is poor.

> **NOTE** **This procedure has numerous steps. To help maintain your place in the procedure, check off each step after completing it.**

1. Disconnect the needle seal line fitting from port 5 of the injection valve.

2. Press **Menu**, **8**, and **5** to go to the **LIQUID CONTROL** screen.

3. With the cursor in the **VIAL#** field, press **Select** ∇ to select **INJ** and press **Enter**.

    The needle arm moves to the inject port.

4. Select the following options:
    Note: Throughout the procedure, retain the current or default settings for options that are not listed.

    from FLUSH
    SYRINGE SPEED: **5**
    SYRINGE: **SAMPLE**
    ACTION: **FILL**

5. Press **Enter**.
    Note: Throughout the procedure, to initiate the selected action, the cursor must be in the **ACTION** field when you press **Enter**.

6. Select **ACTION: EMPTY** and press **Enter**.

7. Select the following options:

    ASPIRATE: **60** μL
    from NEEDLE
    SYRINGE SPEED: **3**
    ACTION: **ASPIRATE**

8. Press **Enter**.

9. Select **VIAL#**: **FLU** and press **Enter.**

    The needle arm moves to the flush port.

10. Select **ACTION: EMPTY** and press **Enter**.

11. Select the following options:

     from FLUSH
     SYRINGE SPEED: **5**
     ACTION: **FILL**

12. Press **Enter**.

13. Select the following options:

     DISPENSE: **50** μL
     SYRINGE SPEED: **5**
     ACTION: **DISPENSE**

14. Press **Enter**.

15. Select **VIAL#**: **INJ** and press **Enter.**

     The needle arm moves to the inject port.

16. Select the following options:

     DISPENSE: **1** μL
     SYRINGE SPEED: **1**
     ACTION: **DISPENSE**

17. Press **Enter**.

     The syringe dispenses 1 μL.

18. Continue pressing **Enter**, counting each key press, **until a tiny drop of liquid appears at the end of the needle seal line**. After each key press, wait until the sound of the syringe motor stops before pressing **Enter** again.

19. Record the number of times you pressed **Enter** (including the first time in Step 17). Also, notice the size of the liquid drop. This will be compared to the size of the liquid drop in Step 32.

20. Select the following options:

     ASPIRATE: **60** μL
     from NEEDLE
     SYRINGE SPEED: **3**
     ACTION: **ASPIRATE**

21. Press **Enter**.

22. Select **VIAL#**: **FLU** and press **Enter.**

    The needle arm moves to the flush port.

23. Select the following options:

    SYRINGE SPEED: 5
    ACTION: EMPTY

24. Press **Enter**.

25. Select the following options:

    from FLUSH
    SYRINGE SPEED: **5**
    ACTION: **FILL**

26. Press **Enter**.

27. Select the following options:

    DISPENSE: **50** μL
    SYRINGE SPEED: **5**
    ACTION: **DISPENSE**

28. Press **Enter**.

29. Select **VIAL#**: **INJ** and press **Enter.**

    The needle arm moves to the inject port.

30. Select the following options:

    DISPENSE: # of key presses (microliters) recorded in Step 19
    SYRINGE SPEED: **3**
    ACTION: **DISPENSE**

31. Press **Enter**.

32. Verify that a drop of liquid appears at the end of the needle seal tubing. If no drop appears or if the size of the drop is different, repeat Step 7 through 32.

33. Select **VIAL#**: **FLU** and press **Enter.**

34. Select the following options:

    SYRINGE SPEED: **5**
    ACTION: **EMPTY**

35. Press **Enter**.

36. Press **Home** to move the needle arm to the home position.

37. Press **Menu** twice to go to the **MENU of SCREENS**.

38. Press **5** twice to go to the **SYSTEM PARAMETERS** screen.

```
            SYSTEM PARAMETERS

              WAIT:   ENABLED
     SYRINGE SPEED:   4
CUT SEGMENT VOLUME:   10    uL
  INJECT PORT VOLUME: 43    uL
SRS POWER SWITCHING:  DISABLED
 Help Prompt
```
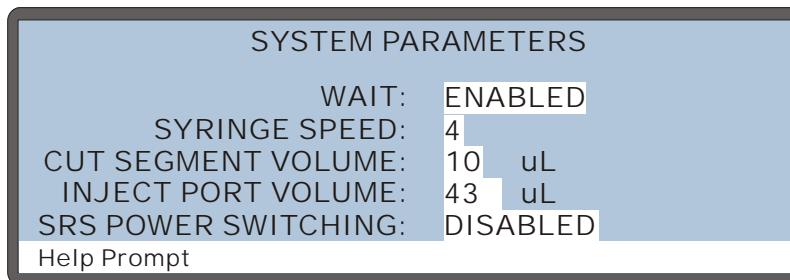
Figure 5-20. System Parameters Screen

39. In the **INJECT PORT VOLUME** field, enter the number of key presses (microliters) recorded in Step 19.

> **NOTE You can enter the inject port volume on the Chromeleon Wellness panel instead of on the SYSTEM PARAMETERS screen (see Section 5.15).**

40. Press **Enter**.

41. Factory calibration settings are recorded on a label on the inside of the autosampler compartment door. Record the new inject port volume on the label.

42. If you are performing this procedure after replacing the needle seal assembly:

    a. Slide the bolt and ferrule removed from the old needle seal line onto the end of the new needle seal line, or install a new bolt and ferrule fitting.

    b. Connect the needle seal line fitting to the injection valve. Tighten the fitting fingertight and then tighten it an additional one-quarter turn using the 5/16-in wrench.

5.9   Replacing the Leak Sensor

1. Remove the drip tray from the autosampler (see Section 5.4).

2. Unhook the leak sensor from the drip tray and pull the leak sensor cable out until the connector is visible.

3. Unplug the old leak sensor and connect a new leak sensor (P/N 053669).

4. Attach the sensor to the drip tray, push the cable inside the autosampler compartment, and reinstall the drip tray (see Section 5.5).

> **NOTE** **Make sure the bottom wire on the leak sensor is not touching the tray. There should be at least a paper-width gap between it and the tray.**

> **NOTE** **After installing the drip tray, make sure the tray is not tilted to the left; if it is, liquid will not drain properly during operation.**

5. Calibrate the new sensor (see Section 5.10).

5.10 Calibrating the Leak Sensor

> **NOTE** **You can also calibrate the leak sensor from the Chromeleon Wellness panel (see Section 5.15).**

1. If you are calibrating an existing (not a new) leak sensor, remove the drip tray from the autosampler (see Section 5.4) and thoroughly clean and dry the tray and sensor.

2. Replace the sensor in the tray and reinstall the drip tray (see Section 5.5).

3. Press **Menu**, **8**, and **0** to go to the **LEAK SENSOR CALIBRATION AND STATUS** screen.

4. Press **Select** Δ or **Select** ∇ to select **CAL** and then press **Enter**.

5. The current measured value becomes the new calibration value.

5.11 Removing the Sample or Prep Syringe Valve

1. From the **MENU of SCREENS**, press **5** and **3** to go to the **PLUMBING CONFIGURATION** screen.

2. Move the cursor to the **SAMPLE SYRINGE CONFIG** field or the **PREP SYRINGE CONFIG** field (depending on which syringe requires initialization).

3. Press **Select** Δ to select the **INITIALIZE** option.

4. Press **Enter**.

   The syringe plunger moves to the initial position and the syringe motor shuts off.

5. Unscrew and remove the syringe drive connecting screw and the two screws on the syringe valve (see Figure 5-21).

6. Pull the valve and syringe assembly straight out to remove it.

7. Holding the syringe at the top fitting, unscrew it from the valve.

8. Set the syringe aside in a safe place.
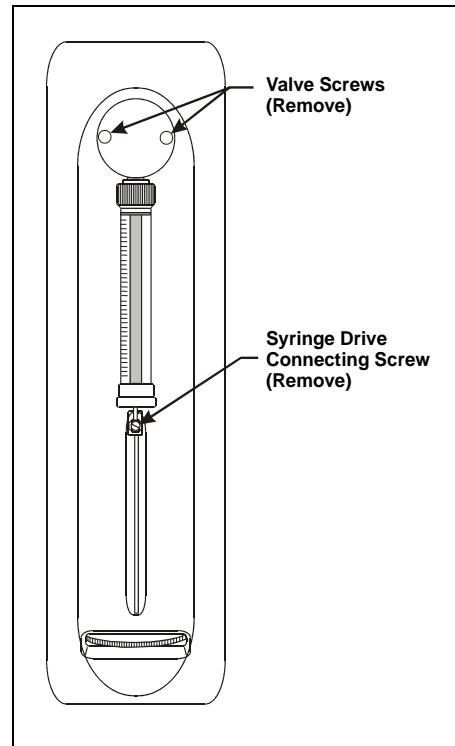
Figure 5-21. Removing the Syringe Valve

5.12 Replacing the Sample Syringe Valve

1. Disconnect the liquid lines from the existing valve.

2. Remove the existing valve (see Section 5.11).

3. When the valve is
    removed, the syringe
    drive shaft is visible.
    When the syringe is in
    the initial position (the
    position selected when
    the valve was
    removed), the slot in
    the drive shaft should
    be horizontal (see
    Figure 5-22).
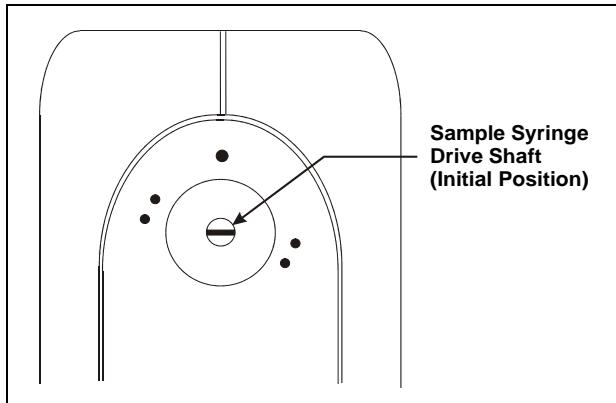
*Figure 5-22. Sample Syringe Drive Shaft
Initial Position*

If the slot in the drive shaft is not horizontal, the syringe drive may need
replacing. Contact Dionex for assistance. Do not attempt to manually turn the
drive shaft.

4. Check the back of the
    new sample syringe
    valve (P/N 054242).
    The valve drive shaft
    should be perpendicular
    to valve ports A and D
    (see Figure 5-23).

    If it is not, rotate the
    valve rotor until the
    drive shaft is in the
    correct position.
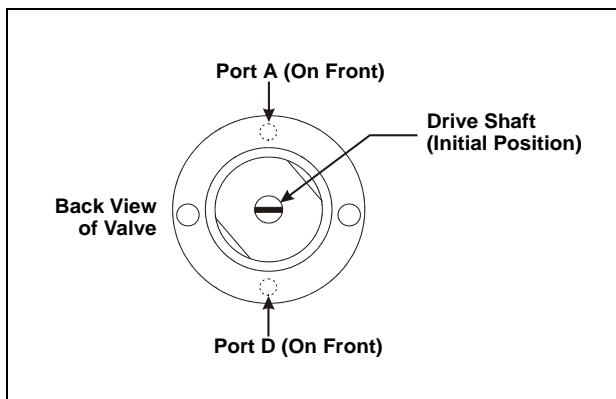
*Figure 5-23. Sample Syringe Valve Drive Shaft
Initial Position*

5. Each valve port must contain a white Teflon washer. Check the inside of each port and insert a washer (P/N 061315), if one is not already present. The washers are supplied with the valve and with the AS50 Preventive Maintenance Kit.

6. Holding the syringe at the top fitting, screw it into the bottom of the valve at port D and tighten fingertight.

7. With valve ports A and D at the 12 o'clock and 6 o'clock positions, respectively, push the valve onto the syringe drive shaft.

8. Replace the two valve thumbscrews and partially tighten.

9. Carefully align the syringe piston with the connecting screw mount on the syringe drive.

10. Insert the syringe drive connecting screw and tighten fingertight. Finish tightening the valve thumb screws.

11. Reconnect the valve liquid lines. Tighten the fittings fingertight.

IMPORTANT **If a fitting leaks after operation is resumed, tighten it slightly. Do not overtighten; overtightening can damage the inside of the valve.**

12. From the **MENU of SCREENS**, press **5** and **3** to go to the **PLUMBING CONFIGURATION** screen. Set the syringe home position (see Section 5.2.5).

13. On the **PLUMBING CONFIGURATION** screen, move the cursor to the **SAMPLE SYRINGE VOLUME** field. Press **Select** Δ or **Select** ∇ to select the syringe volume. Press **Enter**.

5.13 Replacing the Prep Syringe Valve

1. Disconnect the liquid lines from the existing valve.

2. Remove the existing valve (see Section 5.11).

3. When the valve is removed, the syringe drive shaft is visible. When the syringe is in the initial position (the position selected when the valve was removed), the slot in the drive shaft should be in the 11 o'clock position (see Figure 5-24).
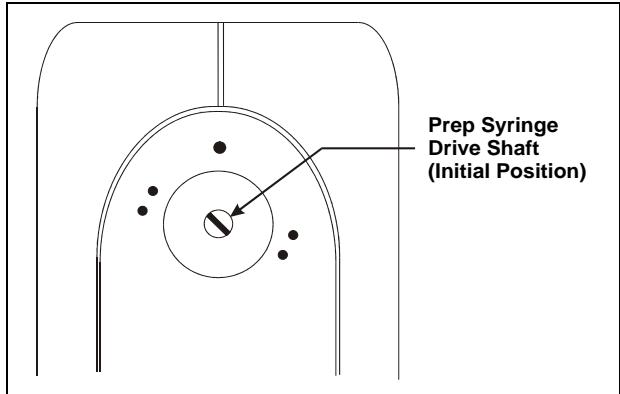
Figure 5-24. Prep Syringe Drive Shaft Initial Position

If the slot in the drive shaft is not in this position, the syringe drive may need replacing. Contact Dionex for assistance. Do not attempt to manually turn the drive shaft.

4. Check the back of the new prep syringe valve (P/N 054243). The valve drive shaft should be perpendicular to valve ports N and D (see Figure 5-25).
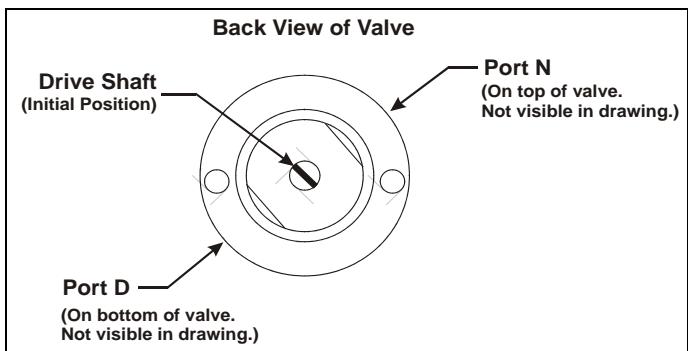
Figure 5-25. Prep Syringe Valve Drive Shaft Initial Position

If it is not, rotate the valve rotor until the drive shaft is in the correct position. To check the position, insert the end of a paper clip into valve port N. The paper clip should be inserted fully into the port.

5. Each valve port must contain a white Teflon washer. Check the inside of each port and insert a washer (P/N 061315), if one is not already present. The washers are supplied with the syringe valve and with the AS50 Preventive Maintenance Kit.

6. Holding the syringe at the top fitting, screw it into the bottom of the valve at port S and tighten fingertight.

7. With valve ports L and B at the 12 o'clock position and the syringe at the 6 o'clock position, push the valve onto the syringe drive shaft.

8. Replace the two valve thumbscrews and partially tighten.

9. Carefully align the syringe piston with the connecting screw mount on the syringe drive.

10. Insert the syringe drive connecting screw and tighten fingertight. Finish tightening the valve thumbscrews.

11. Reconnect the valve liquid lines. Tighten the fittings fingertight.

> **IMPORTANT** **If a fitting leaks when operation is resumed, tighten it slightly. Do not overtighten. Overtightening can damage the inside of the valve.**

12. From the **MENU of SCREENS**, press **5** and **3** to go to the **PLUMBING CONFIGURATION** screen. Set the syringe home position (see Section 5.2.5).

13. On the **PLUMBING CONFIGURATION** screen, move the cursor to the **PREP SYRINGE VOLUME** field. Press **Select** Δ or **Select** ∇ to select the syringe volume. Press **Enter**.

5.14 Changing the Main Power Fuses

The fuse holder is part of the main power receptacle on the rear panel of the AS50 autosampler compartment.

1. Turn off the main power.

⚠ **WARNING**

HIGH VOLTAGE—Disconnect the main power cord from its source and also from the rear panel of the AS50.

⚠ **AVERTISSEMENT**

HAUTE TENSION—Débranchez le cordon d'alimentation principal de sa source et du panneau arrière du AS50.

⚠ **WARNUNG**

HOCHSPANNUNG—Ziehen Sie das Netzkabel aus der Steckdose und der Netzbuchse auf der Rückseite des AS50.

2. A recessed lock is located on each side of the fuse holder (see Figure 5-26). Using a small screwdriver, push each lock toward the center to release it. The fuse holder pops out approximately 0.16 cm (^{1}/16 in) when the locks release. When both locks are released, pull the fuse holder straight out of its compartment.
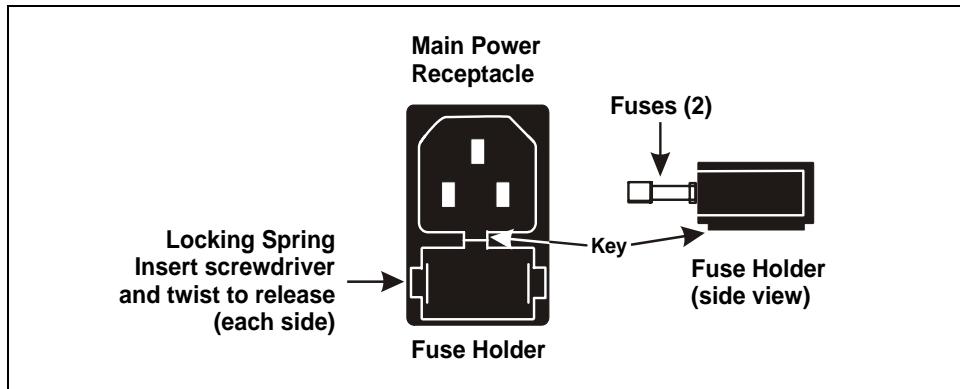
Figure 5-26. Autosampler Compartment Main Power Fuse Holder

3. The holder contains two fuses. Replace both with new 3.15 amp fast-blow IEC 127 fuses (P/N 954745). Dionex recommends replacing both fuses.

4. Reinsert the fuse holder into its compartment. The fuse holder is keyed to fit only in its proper orientation. Apply sufficient pressure evenly against the holder to engage the two locks. The holder is flush against the panel when both locks are engaged.

5. Reconnect the main power cord and turn on the power.

5.15 Using the Chromeleon Wellness Panel

5.15.1 Opening the Wellness Panel

1. Open the Chromeleon Browser and expand the **Dionex Templates** folder.

2. Expand the **Panels** folder and then the **Wellness** folder.

3. On the right pane of the Browser window, double-click **Dionex_autosampler_wellness.pan**. The Wellness panel appears.

4. Open the **Control** menu and click **Connect to Timebase**. Connect to the timebase in which the AS50 is configured. When connected, the controls on the Wellness panel are enabled (see Figure 5-27).
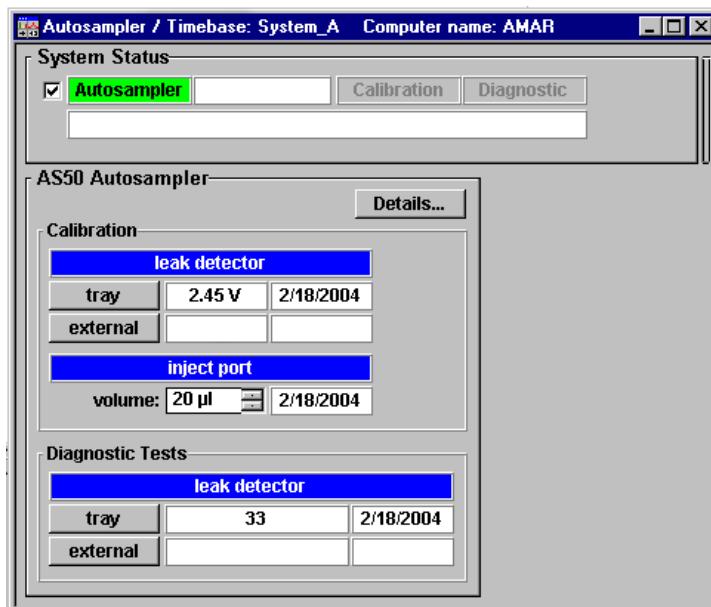
Figure 5-27. Chromeleon Wellness Panel

5. **To calibrate the leak detector**, click the **tray** button under **Calibration**.

   The AS50 calibrates the sensor and then uploads the new value to Chromeleon. Chromeleon stores the new calibration value as the current value.

6. **To test the leak sensor**, click **tray** under **Diagnostic Tests**.

   The AS50 tests the sensor and then uploads the results to Chromeleon.

7. **To enter a new inject port volume** after calibration (see Section 5.8), type the new volume into the **volume** field under **Calibration**, **inject port**, and press **Enter**.

   Chromeleon downloads the value to the autosampler and stores this calibration value as the current value.

A • Specifications

A.1   Autosampler

A.1.1   Electrical

Main Power   100 to 240 Vac, 50/60 Hz; 6 amps. The AS50 power supply is main voltage auto-sensing and requires no adjustment.

Fuses   Two 3.15 amp fast-blow IEC 127 fuses (P/N 954745)

A.1.2   Environmental/Physical

Ambient Operating Temperature   10 to 40 °C (50 to 104 °F)

Operating Humidity   10 to 95% relative humidity, non-condensing

Decibel Level   <60 db (at "A WEIGHTING" setting)

Dimensions   58 cm high x 30 cm wide x 46 cm deep (23 in x 12 in x 19 in)

Weight   < 30 kg (< 65 lb)

A.1.3   Valves (Optional)

Injection (simultaneous injection option only)

Two two-position, six-port, electrically-activated Rheodyne valves PEEK with Tefzel® rotor seal

A.1.4   Injection

Injections Per Vial

1 to 99

Vial Sizes Available

0.3 mL polymer vials (P/N 055428, package of 100)
1.5 mL glass vials (P/N 055427, package of 100)
10 mL PolyVials (P/N 055058, package of 100)

Variable Volume Range

1.9 to 99.9 μL in 0.1 μL increments
100 to 1000 μL in 1 μL increments

If the simultaneous injection option is installed):
1000 to 5000 μL (5 mL sample syringe)
1000 to 8000 μL (10 mL sample syringe)

Injection Loop Size (simultaneous injection option only)

25 μL standard; other sizes are available

A.2   Sample Temperature Control Unit (Optional)

Temperature Control Range	4 to 60 °C in 1 °C increments at 24 °C (75 °F) ambient, stable to ±0.2 °C
Operating Humidity	5 to 90% relative humidity, noncondensing Cooling capacity is slightly reduced at high humidity
Dimensions (Sample Temp. + Autosampler)	65 cm high x 30 cm wide x 46 cm deep (2.75 in x 12 in x 19 in)
Weight (Sample Temp. + Autosampler)	<38 kg (<81 lb)

B • Installation

This chapter provides installation instructions for the initial setup of the AutoSelect AS50 Autosampler. Instructions for installing optional components, such as the sample preparation option and USB connections for computer control, are also provided.

If the installation instructions refer you to a manual for another Dionex instrument or chromatography component, you can find the manual on the Dionex Reference Library CD-ROM (P/N 053891), located in the AS50 Ship Kit (P/N 061270 or P/N 061271).

B.1 Facility Requirements

- Make sure the AS50 meets the power and environmental specifications listed in Appendix A.

- Install the AS50 on a sturdy workbench at a height that ensures convenient viewing of the front panel display and access to the interior.

CAUTION

Two or more persons should lift the AS50, which weighs more than 18 kg (40 lb). Lift the AS50 only from each side of the cabinet bottom. Lifting from the front door will damage the door hinges.

MISE EN GARDE

Au moins deux personnes peuvent soulever l'AS50, qui pèse plus de 18 kg (40 lb). Ne soulevez l'AS50 que par chaque côté du fond de l'armoire. Son soulèvement par la porte du panneau avant endommagera les charnières de la porte.

VORSICHT

Der AS50 wiegt über 18 kg. Daher sollte das Gerät nur von zwei oder mehr Personen angehoben werden. Greifen Sie dazu an beiden Seiten unter das Gerät. Heben Sie den Autosampler nicht an der Vordertür an, da dadurch die Türangeln beschädigt werden könnten.

B.2   Unpacking

1.   Remove the top of the AS50 shipping box.

2.   Follow the instructions in Appendix F to unpack the module.

> **IMPORTANT** **After unpacking, save the shipping restraints. To stabilize the sampling arm and prevent damage, always reattach these shipping restraints before moving or shipping the AS50.**

3.   If desired, set the AS50 on the bench sideways while installing it, to allow easy access to the rear panel connections.

Recommended System Layout

Place the AS50 on the workbench to the left of the other system module(s). This allows the shortest liquid line connections between the AS50 and the chromatography components (injection valve, pump, column, etc.).

B.3   Autosampler Installation

B.3.1   Before You Begin

- Install the chromatography system components (pump, detector, column, suppressor, etc.) before installing the autosampler.

- Before connecting the AS50 to a Chromeleon PC, make sure Chromeleon is installed on the PC. Refer to *Installing the Chromeleon Chromatography Management System with a Dionex Ion Chromatograph* (Document No. 031883) for instructions.

B.3.2   Installation Checklist

❑   Connect the syringe(s) and drain line

❑   Connect the injection valve

❑   (Optional) Connect the AS50 to the Chromeleon PC

❑   Plug the power cord into a grounded power source

❑   Turn on the system power

❑   Select the module setup options

❑   Prime the liquid lines

❑   Remove bubbles from the syringe

B.3.3 Connecting the Syringe(s) and Drain Line

1. Remove the acorn nut from the fitting on the sample transfer line, which extends from the AS50 rear panel. Gently pull the line out the rear panel until there is enough free tubing (about 45 cm (18 in)) to route the line to the front of the sample syringe.

2. Remove the 1/4-28 plug from port C on the sample syringe valve. Make sure the white Teflon washer remains installed inside the port.

3. Connect the sample transfer line to port C (see Figure B-1).
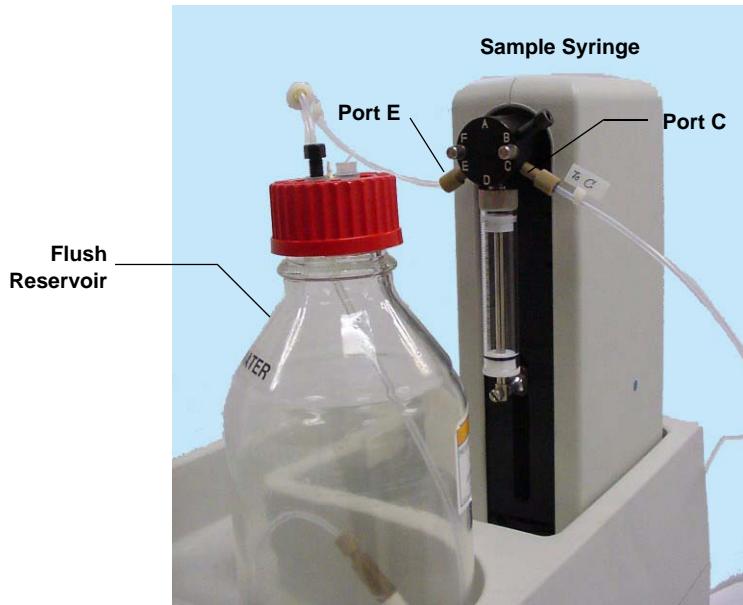
Figure B-1. Syringe Connections

4. Fill the flush reservoir (P/N 057408) with flush fluid (normally deionized water) and place it in the organizer.

5. Remove the 1/4-28 plug from port E on the sample syringe. Make sure the white Teflon washer remains installed inside the port.

6. Remove the acorn nut from the line that extends from the flush reservoir cap and connect the line to port E (see Figure B-1).

7.   If the sample temperature control option is installed, locate the drain line (P/N 055075) in the AS50 Ship Kit (P/N 061271) and push the line onto the fitting on the lower right front corner of the sampler temperature control unit.

8.   Place the end of the drain line that extends from the lower right front corner of the autosampler compartment (see Figure B-2) or sample temperature control unit into a waste container.
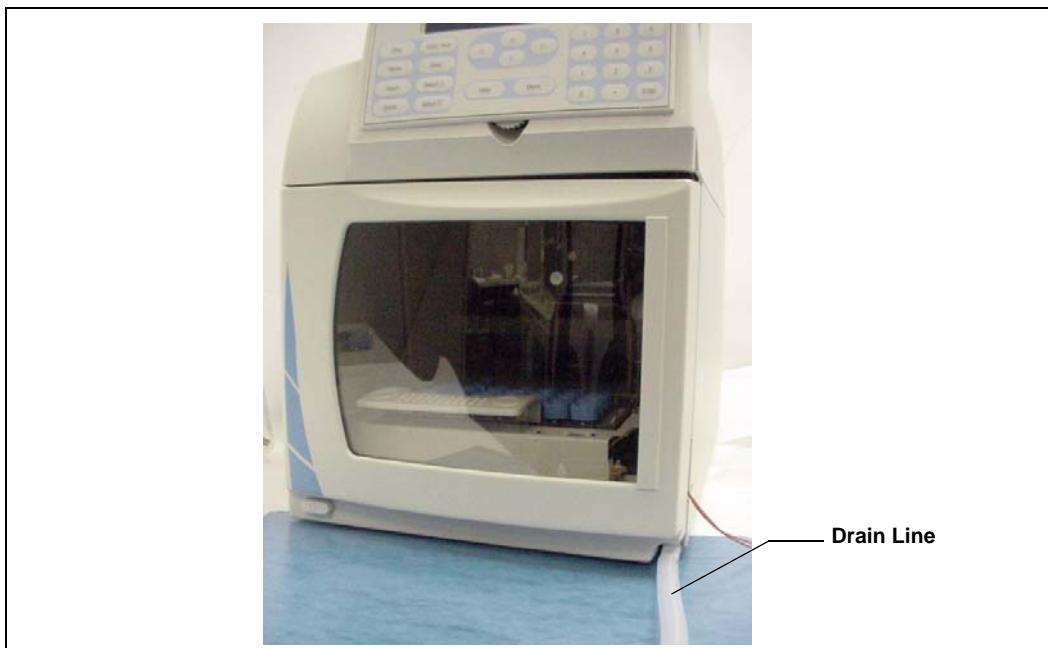
Figure B-2. Autosampler Compartment Drain Line

IMPORTANT **For correct drainage, make sure the tubing is not bent, pinched, or elevated at any point. Do not allow the end of the waste line to be submerged in waste liquid.**

⚠ CAUTION **Neutralize acidic and caustic wastes before disposal. Dispose of all wastes in accordance with local regulations.**

⚠ **MISE EN GARDE**

Neutralisez les déchets acides ou caustiques avant de les jeter. Jetez les déchets aux règlements locaux.

⚠ **VORSICHT**

Neutralisieren Sie säurehaltige und ätzende Abfälle vor ihrer Entsorgung. Entsorgen Sie alle Abfälle entsprechend den lokalen Bestimmungen.

9. Connect the cable from the sample syringe to the **SAMPLE SYRINGE** connector on the rear panel (see Figure B-3).

10. If the sample preparation option is installed, connect the cable from the prep syringe to the **PREP SYRINGE** connector on the rear panel.
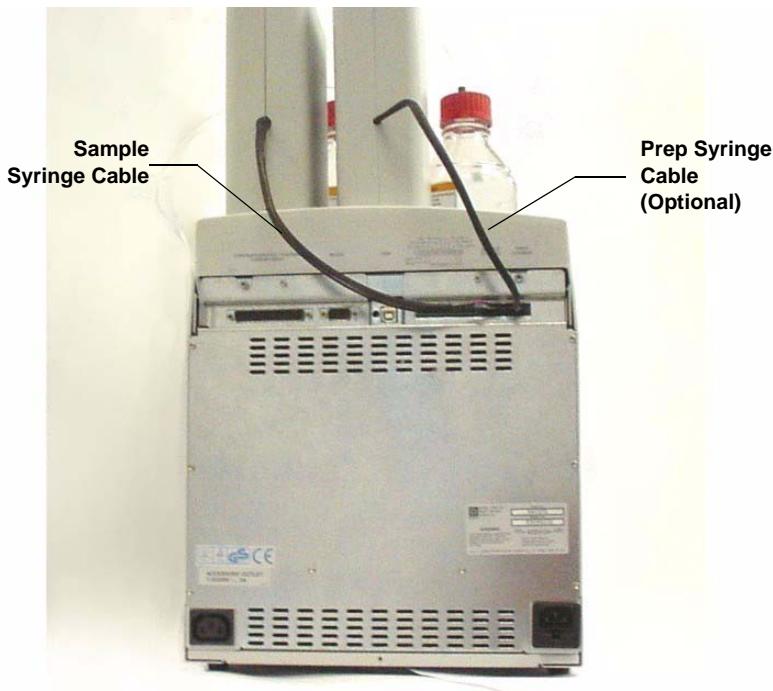
Figure B-3. Rear Panel Connections

Sample Preparation Option Setup

1. Fill the reagent reservoir(s) (P/N 054808) with the desired reagent(s) and place them in the organizer.

2. If you are installing a single reagent reservoir, connect the line that extends from port A on the prep syringe valve to the reservoir cap.

3. If you are installing additional reagent reservoirs, connect the lines from ports B, C, and/or D to the additional reservoirs.

> **NOTE** **Port letters A through D on the prep syringe valve correspond to reagent reservoirs A–D on the AS50 front panel screens and in Chromeleon software.**
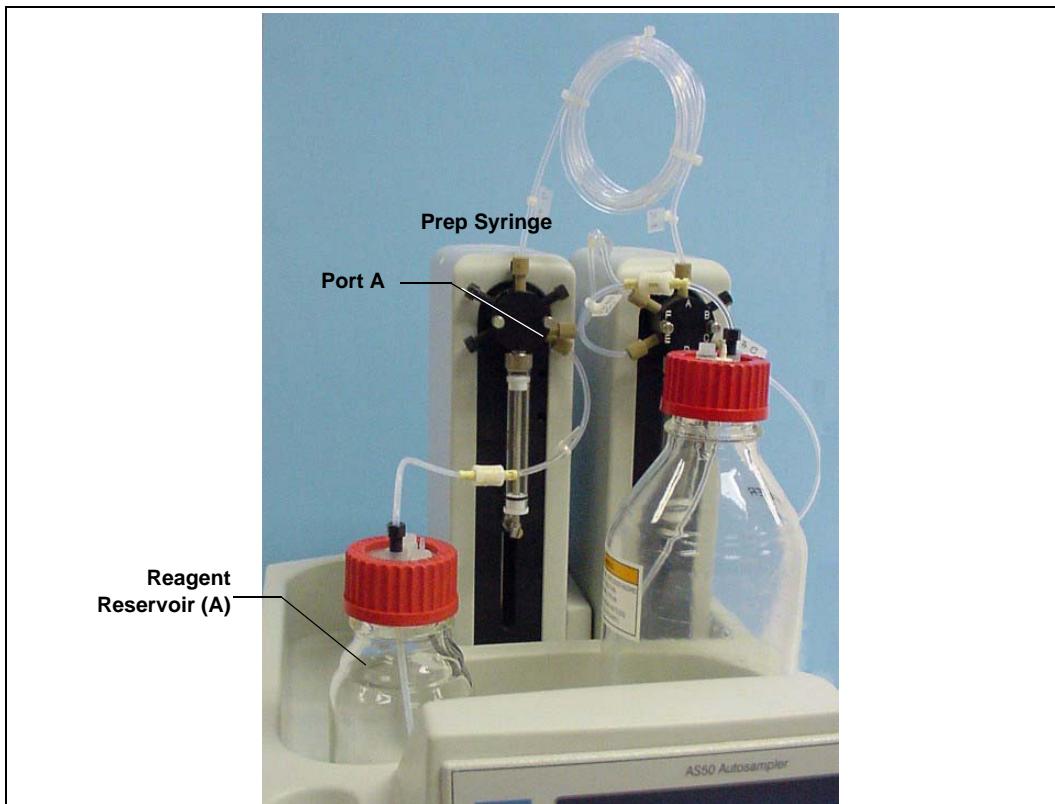
Figure B-4. Sample Preparation Option Connections

B.3.4 Connecting the Injection Valve

> **NOTE** **If your AS50 is equipped with the simultaneous injection option, refer to Appendix E for set up instructions.**

1. Open the AS50 and IC system module doors.

2. The needle seal line that extends from the inject port in the autosampler is coiled inside the AS50 door, on the right side. Route this line through the side slot on the AS50 (see Figure B-5) and then through the side slot on the IC system module to the injection valve.

IMPORTANT **Do not cut the needle seal line to shorten it, and do not replace it with a different line. The needle seal line is specially constructed and the autosampler will not function correctly if this line is cut.**

Route the AS50 needle seal line to the injection valve

Insert the waste line from the injection valve here
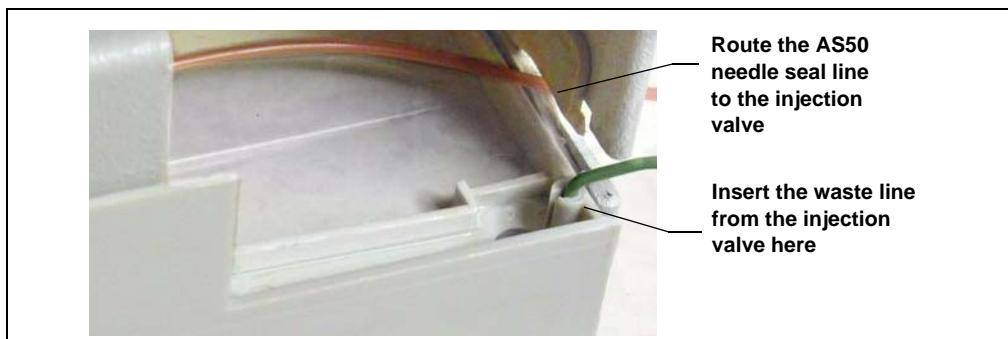
Figure B-5. AS50 Drip Tray

3. Connect the needle seal line from the AS50 to port S (5) on the injection valve (see Figure B-6).

4. Locate the green waste line connected to port W (6) on the injection valve (see Figure B-6).

AS50 Needle Seal Line
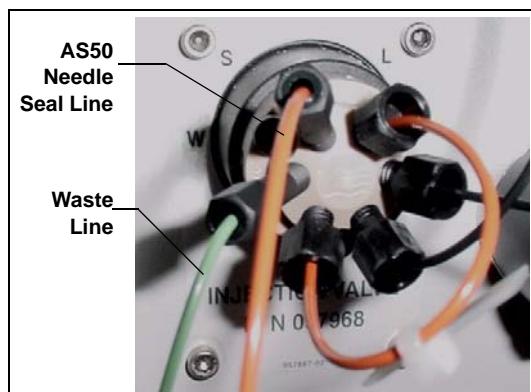
Waste Line

Figure B-6. AS50 Injection Valve

This line (labeled **AS50 TRAY**) is connected with a union to a Teflon waste line (see Figure B-7), which is routed through the tubing chase to the IC system module rear panel.

5. Disconnect the green **AS50 TRAY** line from the union and route the line to the drip tray in the autosampler compartment.
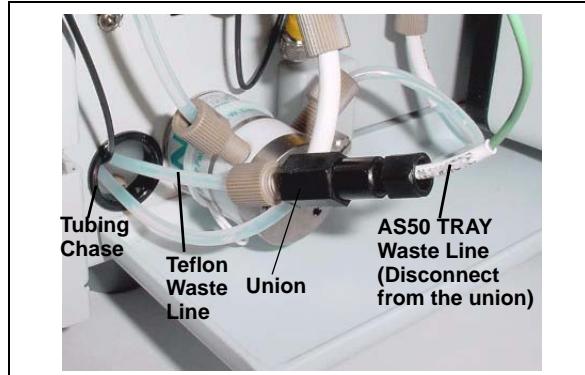
Figure B-7. Injection Valve Waste Line Union (ICS-1000/1500/2000)

You can either leave the disconnected Teflon waste line and union in the tubing chase, or pull the line out from the front.

6. To ensure the green **AS50 TRAY** line stays in place in the opening in the drip tray, sharply bend the line about 5 mm (1/2 in) from the end, being careful not to restrict the inner diameter.

7. Push the end of the green **AS50 TRAY** line into the small round opening on the right side of the AS50 tray (see Figure B-5).

IMPORTANT

Make sure the injection valve waste line is not elevated above the injection valve at any point between the valve and the AS50 drip tray.

NOTE   **Do not push the end of the waste line into the large drain tube opening in the AS50 tray.**

B.3.5   Connecting the AS50 to the Chromeleon PC (Optional)

The AS50 rear panel (see Figure B-3) provides a USB receptacle for connecting the AS50 to a USB port on the Chromeleon PC or a USB hub.

IMPORTANT **Before connecting the USB cable and turning on the AS50 power, verify that Chromeleon is installed on the PC.**

When Chromeleon is installed first, the USB driver information is loaded when the power is turned on. Chromeleon then automatically detects the new USB device. Refer to *Installing the Chromeleon Chromatography Management System with a Dionex Ion Chromatograph* (Document No. 031883) for installation instructions and for details about USB connections.

1. Locate the USB cable (P/N 960777) in the AS50 Ship Kit (P/N 061270 or P/N 061271).

2. Connect the cable between the AS50 and computer as shown in Figure B-8.
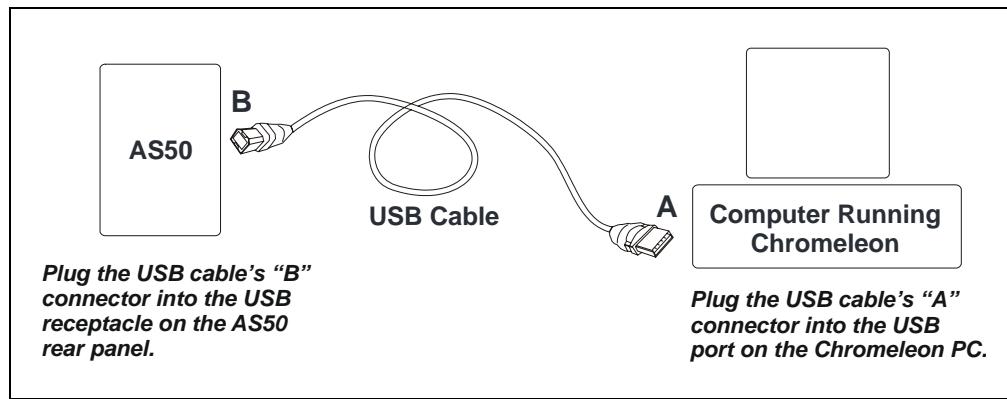
Figure B-8. Connecting the AS50 Directly to the PC

3. If there are no unused USB ports on the PC, connect the AS50 to an external USB hub (P/N 060392) and connect the Chromeleon PC to the hub (see Figure B-9).

      NOTE   All USB connections require standard USB A-to-B cables.

NOTE **If the number of USB devices in the system exceeds the number of available USB ports, connect the devices to the system with a USB hub (P/N 060392). One or more hubs is also required if the AS50 or other USB device is more than 5 meters (16 ft) from the PC. Refer to the manual provided by the hub vendor for complete installation instructions.**

IMPORTANT **The USB standard limits the USB cable length to 5 meters (16 ft). Each USB device can be separated from the PC by no more than five hubs. Thus, each USB device can be located no more than 30 meters (32 yds) from the PC.**
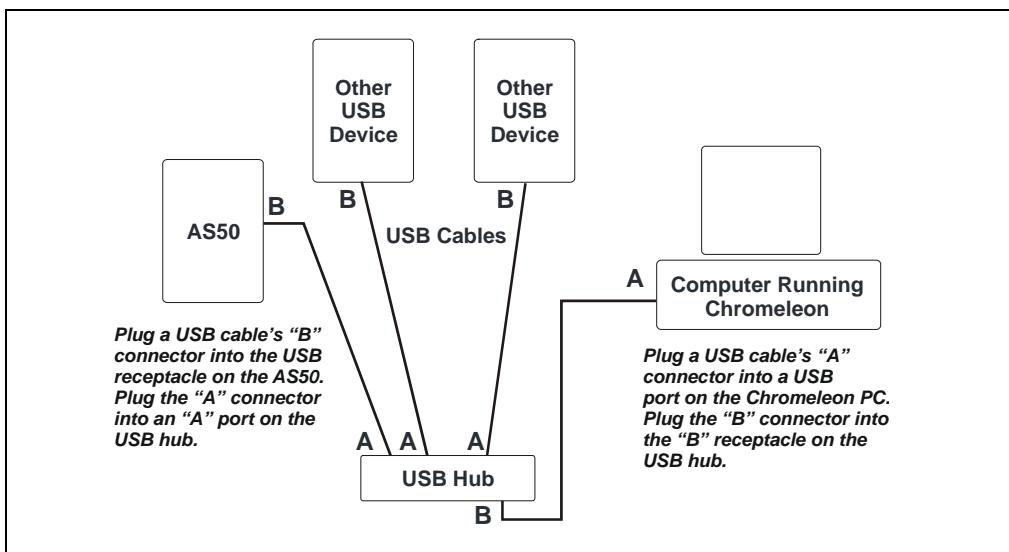
Figure B-9. Connecting the AS50 to a USB Hub

B.3.6   Connecting the Power Cord

Connect the power cord (IEC 320 C13) (ordered separately) from the main power receptacle on the rear panel to a grounded power source. The AS50 power supply is auto-sensing, so no adjustment is required to select the line voltage.

SHOCK HAZARD—To avoid electrical shock, use a grounded receptacle. Do not operate the AS50 or connect it to AC power mains without an earthed ground connection.

The power supply cord is used as the main disconnect device. Make sure the socket-outlet is located near the AS50 and is easily accessible.

Operation at AC input levels outside of the specified operating voltage range may damage the AS50.

DANGER D'ÉLECTROCUTION—Pour éviter toute électrocution, il faut utiliser une prise de courant avec prise de terre. Ne l'utilisez pas et ne le branchez pas au secteur C.A. sans utiliser de branchement mis à la terre.

Le cordon d'alimentation principal est utilisé comme dispositif principal de débranchement. Veillez à ce que la prise de base soit située/installée près du module et facilement accessible.

STROMSCHLAGGEFAHR—Zur Vermeidung von elektrischen Schlägen ist eine geerdete Steckdose zu verwenden. Das Gerät darf nicht ohne Erdung betrieben bzw. an Wechselstrom angeschlossen werden.

Das Netzkabel ist das wichtigste Mittel zur Stromunterbrechung. Stellen Sie sicher, daß sich die Steckdose nahe am Gerät befindet und leicht zugänglich ist.

B.3.7 Turning on the Power

Press the power switch in the lower left corner of the front door to turn on the AS50 power. When the power is turned on, a series of screens are displayed and the autosampler performs a power-up sequence.

- The **COPYRIGHT NOTICE** screen is displayed briefly, and then the **POWER-UP** screen appears.

- While the **POWER-UP** screen is displayed, the AS50 performs initialization procedures and a series of diagnostic tests. If one of the tests fails, testing stops and the **DIAGNOSTIC TEST** screen is displayed. See Section C.9.2 if this occurs.

- When the initialization procedures are complete and the AS50 has passed the diagnostics, the **INSTALLED OPTIONS** screen appears. After a few seconds (or if you press a button), the **MAIN** screen is displayed. The power-up sequence is then complete.

B.3.8 Module Setup

Select Plumbing Configuration Options

1. Press **Menu** and **5** to go to the **MODULE SETUP MENU**.

2. Press **3** to go to the **PLUMBING CONFIGURATION** screen.

```
          PLUMBING CONFIGURATION
             INJECT VALVE:   PEEK
                LOOP SIZE:    25   uL
   SAMPLE SYRINGE VOLUME:    250  uL
   SAMPLE SYRINGE CONFIG:    READY
     PREP SYRINGE VOLUME:    2.5   mL
     PREP SYRINGE CONFIG:    READY
 Help Prompt
```
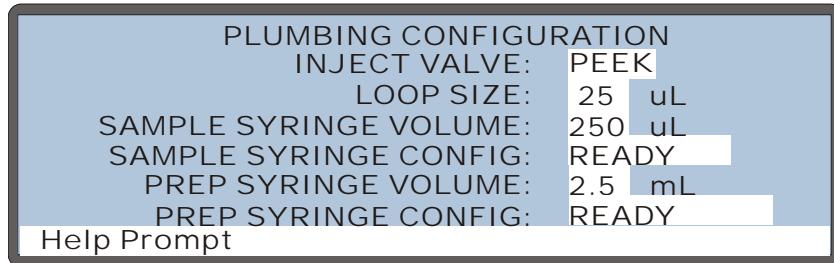
Figure B-10. Plumbing Configuration Screen

3. Verify that **PEEK** is selected in the **INJECT VALVE** field.

4. Move the cursor to the **LOOP SIZE** field and use the numeric buttons to enter the size of the sample loop installed on the injection valve (or on the first injection valve if the simultaneous injection option is installed).

5. Move the cursor to the **SAMPLE SYRINGE VOLUME** field and press **Select** Δ or **Select** ∇ to specify the volume of the sample syringe installed.

IMPORTANT When you select a sample syringe size of 5000 or 10000 μL, simultaneous injection option functions are automatically enabled. For example, in the PLUMBING CONFIGURATION screen, the LOOP SIZE parameter now displays fields for both injection loops.

6. If the sample preparation option is installed, move the cursor to the **PREP SYRINGE VOLUME** field and press **Select** Δ or **Select** ∇ to specify the volume of the prep syringe.

7. If the simultaneous injection option is installed, move the cursor to the **LOOP SIZE: V2** field and enter the size of the sample loop installed on the second injection valve.

8. Press **Enter**.

Set the Time and Date

1. From the **MODULE SETUP MENU**, press **4** to go to the **TIME/DATE** screen.

```
                    TIME/DATE

        ACTUAL TIME:    12:35:00
           SET TIME:    12:34:56
               DATE:    16  JUNE  04


 Help Prompt
```

Figure B-11. Time/Date Screen

2. The **SET TIME** field uses a 24-hour time format (hour:minutes:seconds). Press numeric buttons to enter the time directly or press **Select** Δ or **Select** ∇ to increase or decrease the current values.

3. Move the cursor to the **DATE** field.

4. Press numeric buttons to enter the day and year directly, or press **Select** Δ or **Select** ∇ to increase or decrease the current values. Press **Select** Δ or **Select** ∇ to select the month.

5. After selecting the last option, press **Enter** before exiting the screen.

Enable or Disable the Wait Operation

> **NOTE** **Do not complete this section if the AS50 is controlled by Chromeleon. The software enables the wait function automatically and the setting on the SYSTEM PARAMETERS screen is ignored.**

If the AS50 will be controlled by another instrument through TTL or relay connections, set the **WAIT** field to **ENABLED**.

If the AS50 will control other modules (system master) through TTL or relay connections, set the **WAIT** field to **DISABLED**.

1. From the **MODULE SETUP MENU**, press **5** to go the **SYSTEM PARAMETERS** screen.

```
              SYSTEM PARAMETERS

                  WAIT:  ENABLED
         SYRINGE SPEED:  4
   CUT SEGMENT VOLUME:  10    uL
    INJECT PORT VOLUME:  43    uL
  SRS POWER SWITCHING:  DISABLED
 Help Prompt
```
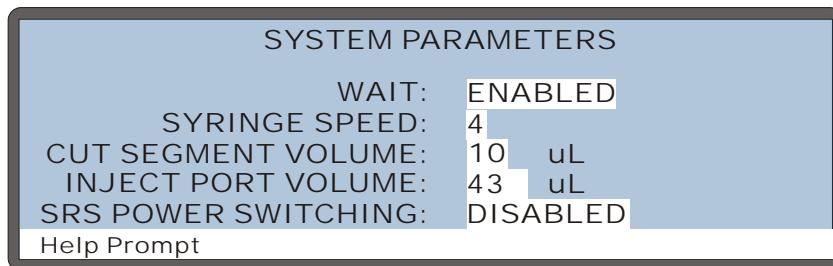
Figure B-12. System Parameters Screen

2. Position the cursor in the **WAIT** field and press **Select** Δ or **Select** ∇ to select either **ENABLED** or **DISABLED**.

3. Press **Enter**.

Notes

*   When Wait is enabled, the AS50 waits for a continue command (either from the front panel **Hold/Run** button or from a TTL input) before performing the next line in a schedule of injections. See Section 2.6.1 for details.

*   When Wait is disabled, a schedule of injections is started by pressing the **Hold/Run** button. The AS50 then performs all injections in the schedule without waiting for any continue commands. See Section 2.6.4 for details.

B.3.9   Configuring the AS50 in Chromeleon

If the AS50 is connected to a Chromeleon PC, follow the guidelines below to add the AS50 to a Chromeleon timebase and connect it to a Control panel. Refer to *Installing the Chromeleon® Chromatography Management System with a Dionex Ion Chromatograph (IC)* (Document No. 031883) for detailed instructions.

- Turn on the computer power and log onto Windows 2000 or Windows XP as an administrator. If the Chromeleon Server is not running (the Server Monitor icon on the taskbar is crossed out in red), start the Server by right-clicking the Server Monitor icon and selecting **Start Server**.

- Start Chromeleon.

- When the **Unassigned Dionex USB Devices Detected** dialog box appears, add the AS50 to an existing timebase or create a new timebase.

- In the Chromeleon Browser, open a template Control panel (go to the **Dionex Templates>Panels>Dionex IC** folder) for the timebase.

- Connect the AS50 timebase to the panel and then save the panel to a different folder.

B.3.10 Priming the Liquid Lines

- See below for priming guidelines if the sample preparation option is not installed.

- See if the sample preparation option is installed.

- See for the priming procedure.

Guidelines for AS50s *Without* the Sample Preparation Option

The priming procedure primes the flush reservoir line to the sampling valve and the sample transfer line from the valve to the sampling needle (see Figure B-13). The priming volume required depends on the size of sampling needle installed. See the table below:

Sample Syringe Size	Suggested Priming Volume
≤1000 μL	2000 to 2500 μL
5000 μL	10,000 μL
10000 μL	20,000 μL
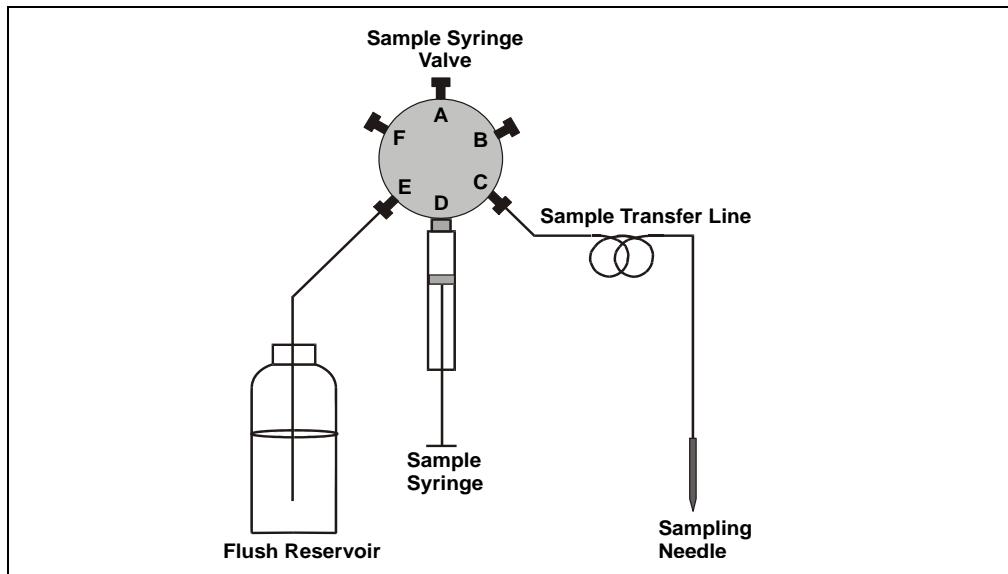
Figure B-13. Sample Syringe Fluid Schematic:
System without the Sample Preparation Option

Guidelines for AS50s with the Sample Preparation Option

The priming procedure consists of two parts:

1. Prime the flush reservoir line, reagent holding loop, and sample transfer line (see Figure B-14).

Reservoir	Syringe	Syringe Size	Total Suggested Priming Volume	Number of Priming Cycles Required*
FLUSH	**PRIME**	2.5 mL	5000 μL	1
		5 mL	10,000 μL	2
		10 mL	20,000 μL	4

* For each priming cycle, enter a **PRIME VOLUME** of 5000 μL.

2. Prime the lines from each installed reagent reservoir.

Reservoir*	Syringe	Syringe Size	Suggested Priming Volume
A, B, C, and **D**	**PRIME**	All	2000 μL

* Repeat the priming procedure for each reservoir.
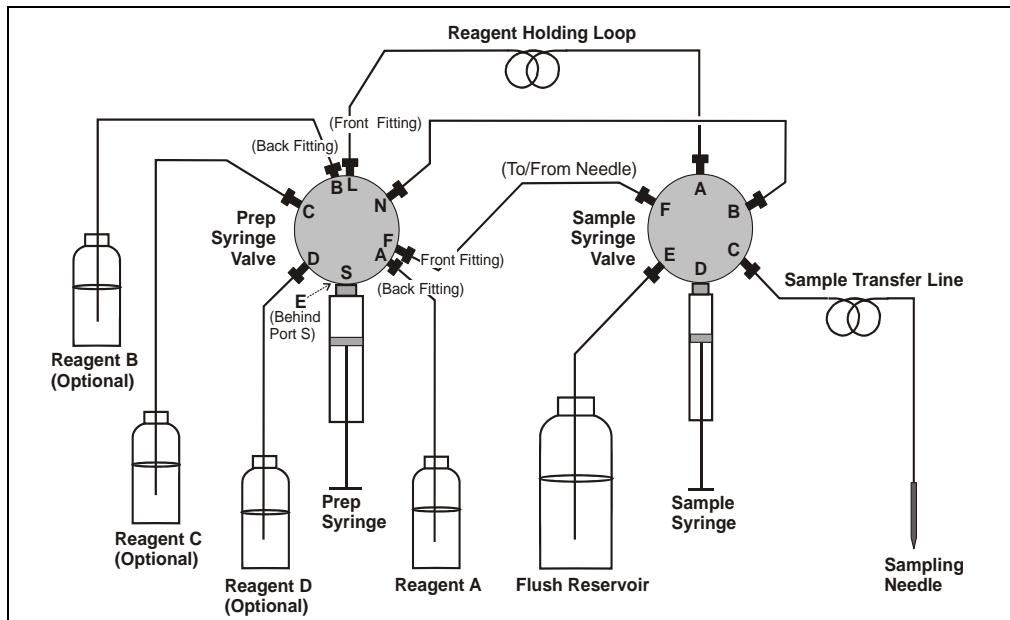
Figure B-14. Sample Preparation Option Fluid Schematic

Priming Procedure

1. On the **MAIN** screen, set the AS50 to **LOCAL** mode and **DIRECT CONTROL**.

2. Press **Menu** and **6** to go to the **FLUSH** screen (see Figure B-15).

3. Enter the desired **PRIME VOLUME**. See the previous guidelines for the suggested volumes.

4. If the sample preparation option is installed:

   a. Move the cursor to the **PRIME RESERVOIR** field and select the reservoir.

   b. Move the cursor to the **PRIME SYRINGE** field and select the **PREP** syringe.

   If the sample preparation option is not installed, the **PRIME RESERVOIR** and **PRIME SYRINGE** fields default to **FLUSH** and **SAMPLE**, respectively, and cannot be edited.

5. Move the cursor to the **PRIME ACTION** field and select **PRIME**.

6. Press **Enter** to start the prime cycle.

```
                   FLUSH/PRIME
      FLUSH                        PRIME
       VOLUME:  400  uL            VOLUME: 2000  uL
    RESERVOIR:  FLUSH           RESERVOIR:  RES A
      SYRINGE:  SAMPLE            SYRINGE:  PREP
       ACTION:  READY              ACTION:  PRIME
    Help Prompt
```
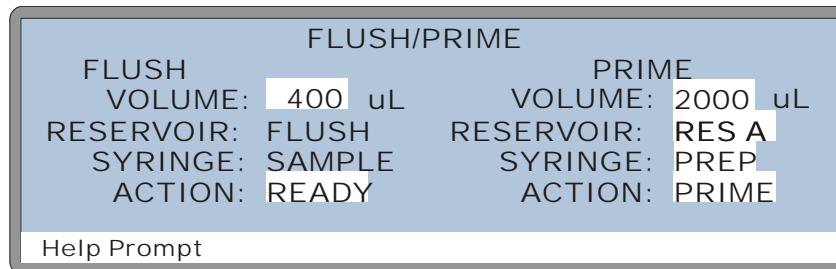
Figure B-15. Initiating a Priming Cycle

7. Repeat the procedure as required (see the previous priming guidelines).

8. When priming is complete, there are often small air bubbles in the top area of the syringe. Remove the bubbles before proceeding. See Section B.3.11 for instructions.

B.3.11 Removing Bubbles from the Syringe

1. Fill a container with isopropyl alcohol.

2. Using a flathead screwdriver, unscrew and remove the syringe drive connecting screw (see Figure B-16).

3. Hold the syringe at the top and bottom and unscrew it from the valve.

4. Point the threaded end up into the air. Push the syringe plunger up and pull down rapidly with short movements to dislodge the bubbles. Repeat until all bubbles are dislodged.

5. Place the threaded end of the syringe into the isopropyl alcohol and slowly pull out the plunger to draw a full syringe volume into the syringe.

Syringe Drive Connecting Screw (Remove)
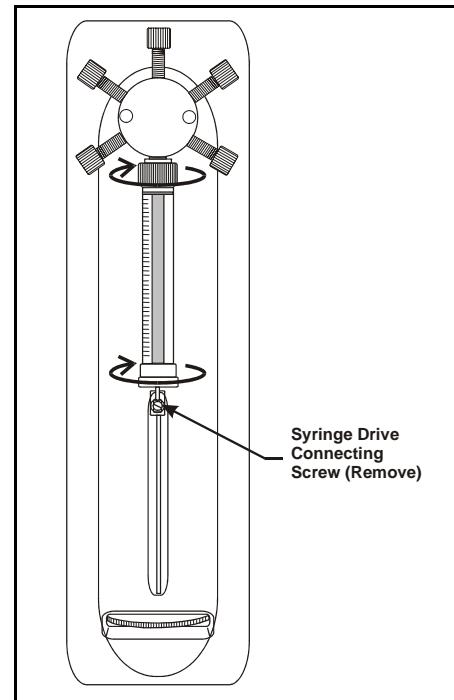
Figure B-16. Removing the Syringe

6. Keeping the syringe in the liquid, slowly push the syringe plunger until the bubble(s) exits the syringe. Then fill the syringe.

7. Remove the syringe from the liquid. While holding it vertically, push a small amount of liquid out the top to make sure there is no air present.

8. Position the syringe under the valve.

9. Holding the syringe at the top and bottom, screw it back into the valve and tighten fingertight.

10. Align the syringe piston with the connecting screw mount on the syringe drive.

11. Insert the syringe drive connecting screw removed in <u>Step 2</u> and tighten fingertight.

12. Perform a flush cycle:

    a. Press **Menu**, **Menu**, and **6** to go to the **FLUSH/PRIME** screen.

    b. Move the cursor to the **ACTION** field and press **Select** Δ or **Select** ∇ to select **FLUSH**. Press **Enter**.

C • Display Screens

This appendix illustrates and describes the screens available for display on the front panel of the AS50. Figure C-1 illustrates the hierarchy of screens.
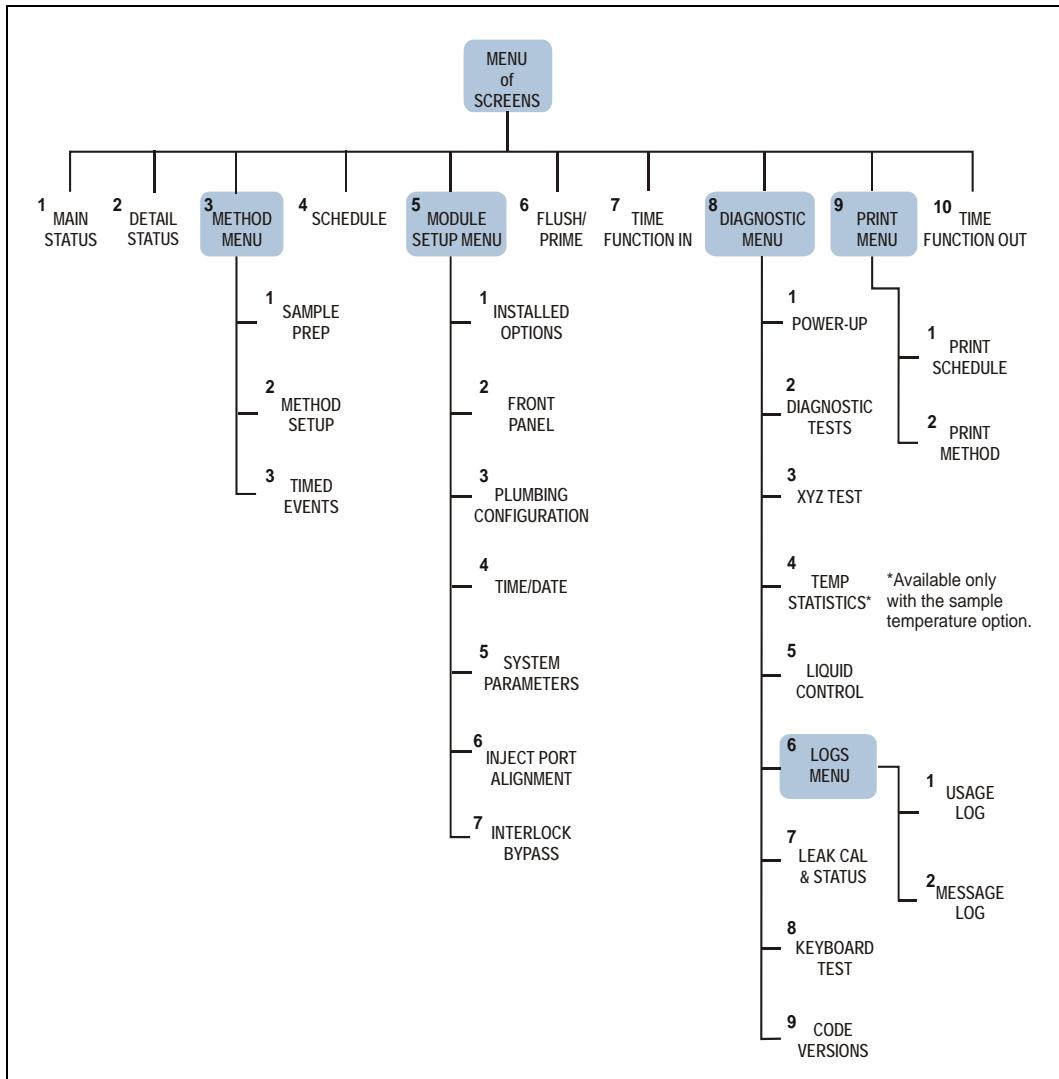
Figure C-1. AS50 Menu Structure

C.1   Menu of Screens

Pressing **Menu** displays the **MENU of SCREENS**, which provides top-level access to the menu structure.

MENU of SCREENS	
1 MAIN STATUS	6 FLUSH/PRIME
2 DETAIL STATUS	7 TIME FUNCTION IN
3 METHOD MENU	8 DIAGNOSTIC MENU
4 SCHEDULE	9 PRINT MENU
5 MODULE SETUP MENU	10 TIME FUNCTION OUT
Help Prompt	
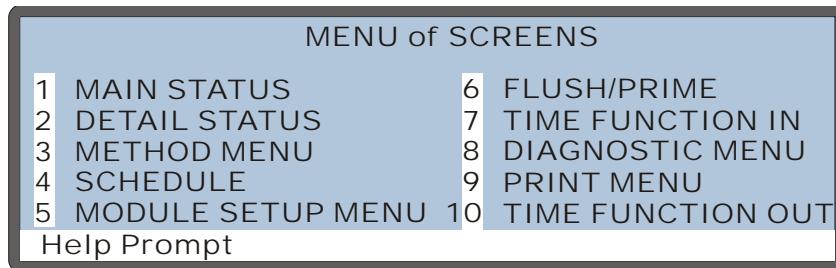
Figure C-2. Menu of Screens

There are two ways to select a screen from a menu:

- Move the cursor to the field containing the screen number and press **Enter**.

- Press the numeric button on the front panel keypad that corresponds to the screen number on the menu.

To display a brief description of each screen, press **Help.**

> **NOTE**   **If no keypad buttons are pressed within a 2-hour period, the backlight automatically turns off. To turn the backlight on again, press any button on the keypad. Press the button a second time if you want to activate its function.**

> **NOTE**   **If the simultaneous injection mode is enabled, several screens change to allow control of two injection valves. Refer to Appendix E for illustrations of these screens and for details about simultaneous injections.**

C.2   Main Status Screen

Use the **MAIN STATUS** screen to:

•   Display the status of basic operating parameters

•   Select operating and control modes

```
                         IDLE
 VIAL#  10              TIME   99.9 min
 INJ#   1/3              VOL    20.0 uL
 TRAY: 20 °C=  COL: - - °C    METHOD:01
  LOCAL                      SCH 1 LINE
 Help Prompt
```
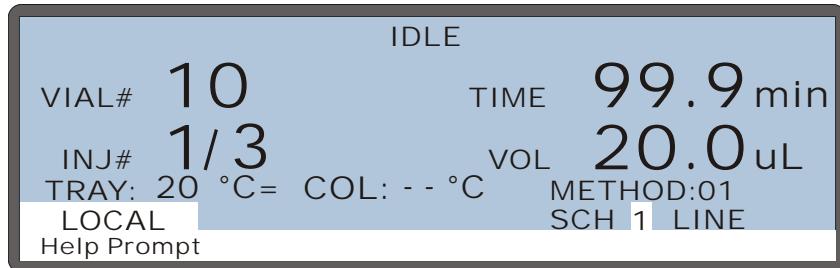
Figure C-3. Main Screen

Screen Field	Description
Status Line (top of screen)	The top line on the screen displays the instrument's current operating status. The following status values are displayed as they occur:

	IDLE	No method is currently running.
	PREPARING TO RUN SCHEDULE	The AS50 is performing pre-schedule operations such as flushing.
	HOLDING	The schedule and method are on hold.
	CHECKING FOR SAMPLE VIAL PRESENCE	At the beginning of a method, the AS50 checks that the specified sample vial is present.
	PIPETTING...	The AS50 is pipetting from one vial to another during the method's sample prep steps.
	DISPENSING...	The AS50 is dispensing from a reservoir during the method's sample prep steps.
	MIXING...	The AS50 is mixing the vial contents during the method's sample prep steps.

Screen Field	Description
FLUSHING...	The needle is being flushed (either during sample prep or between schedule lines).
DELAYING xx.x min	The AS50 is pausing for the period of time specified in the sample prep phase of the method.
DILUTE...	The AS50 is performing a dilution as part of the sample prep phase of the method.
WAITING	The AS50 is waiting for a command to continue running a method. The command can be from the front panel (pressing **Hold/Run**), from Chromeleon, or from a TTL or relay input.
WAITING FOR RUN TO FINISH	The AS50 has completed overlapped sample prep and is waiting for the timed events of the previous method to complete.
EXECUTING SETUP AND INIT STEP	The AS50 is executing the method setup conditions and the **INIT** step of the method's timed events.
WAITING FOR CYCLE TIME TO EXPIRE	The AS50 is waiting for the cycle time to expire before starting the method's timed events.
WAITING FOR TEMP TO STABILIZE	The AS50 is waiting for the column and/or tray temperature to stabilize before starting the method's timed events.
EXECUTING TIMED EVENTS	The AS50 is executing the method's timed events. This status message is displayed until a load or inject step is executed.
LOADING LOOP	Sample is being loaded into the loop during the method's timed events.
INJECTING	Sample is being injected during the method's timed events.
ABORTING, PLEASE WAIT	The AS50 is performing operations necessary to abort the schedule.

Screen Field	Description
VIAL#	The number of the vial from which the injection is occurring. The AS50 updates the vial number after executing the **INIT** step of the method's timed events.
INJ#	The number of injections completed using the current vial on the current schedule line followed by the total number of injections scheduled for this vial.
TRAY °C	If the sample temperature control option is installed, this field displays the current tray temperature. A symbol to the right of this field indicates the temperature status (see the description in **COL °C** below). If the sample temperature control option is not installed, the field displays "--" and it is not backlighted.
COL °C	This field is for support of the thermal compartment option, which is not currently available.
TIME	The number of minutes since the last injection. The clock counts up until the next injection begins or until reaching the maximum time of 999.9 minutes.
VOL	The volume of sample to be injected.
Operating Mode **LOCAL** or **LOCKED RMT** (remote)	Select **LOCAL** mode for control from the front panel. When the AS50 is connected to Chromeleon software, connecting the AS50 to a Chromeleon Control panel automatically selects **LOCKED RMT**. In Locked Remote mode, the front panel keypad is disabled to prevent any changes to operating parameters. To return the AS50 to Local mode, disconnect the AS50 from the Chromeleon Control panel, or turn off the AS50 power. **Note**: The **REMOTE** setting is not used.
Control Mode **SCH** (schedule) or **DIRECT CONTROL**	Press **Select** Δ or **Select** ∇ to select **SCH** (schedule) or **DIRECT CONTROL** mode. When the AS50 is in **LOCKED RMT** mode, Direct Control is always selected. In Schedule mode, the screen displays the number of the currently running schedule, the schedule line, and the method. Enter the schedule number to run (1 to 9) in the **SCH** field.

C.3 Detail Status Screen

Use the **DETAIL STATUS** screen to:

- Display detailed information about the status of AS50 operating parameters. This screen displays all the information shown on the **MAIN STATUS** screen, plus additional parameters.

- Set several parameters for Direct Control operation

> **NOTE** See <u>Section C.2</u> for descriptions of the parameters common to the **MAIN STATUS** and the **DETAIL STATUS** screens.

```
DETAIL              INJECTING
  VIAL#: 1            TIME:  0.0   min      TTL1 0
   INJ#: 1/3          VOL: 25      uL       TTL2 1
METHOD: 01           TRAY: P10 mL           RLY1 0
   TRAY: 25  20 °C↑ LOOP: 25.0   uL        RLY2 0
    COL: --    -- °C  PARTIAL              INJ VLV L
   LOCAL           SCH 1     LINE 1       CS VLV
 Help prompt
```

Figure C-4. Detail Status Screen

> **NOTE** If the simultaneous injection option is installed, the **CS VLV** field is replaced by a second **INJ VLV** field to allow you to set the position of both injection valves. See Appendix E for details.

Screen Field	Description	Values
TRAY °C	If the sample temperature control option is not installed, "--" is displayed and the field is not backlighted.	4 to 60 °C (default=20)
	If the sample temperature control option is installed, this field allows you to set, the tray temperature set point in °C. The actual measured temperature and a symbol indicating the temperature status are displayed to the right of this.	
	= The temperature is stabilized ↑ The temperature is increasing ↓ The temperature is decreasing -- The temperature control option is off	
	Pressing **Select** Δ or **Select** ∇ toggles the tray temperature control on and off. The default is off. When on, the default set point is 20 °C.	
COL °C	This field is for support of the thermal compartment option, which is not currently available.	
TRAY	The tray type in use.	**NONE, 2 mL, P10 mL** (10 mL plastic)
LOOP	The size of the loop in microliters. **Note:** If the AS50 is equipped with two injection valves, two loop sizes are shown.	
(Injection Type)	The type of injection: **FULL** for full-loop injections; **PARTIAL** for partial-loop; **PARTIAL LS** for partial-loop, limited-sample; and **SIM** for simultaneous injection. This field is updated when the initial conditions of the method's timed events are executed.	**FULL PARTIAL PARTIAL LS SIM**
TTL1 TTL2 RLY1 RLY2	Provides TTL and relay control of other devices. In Direct Control, select 1 (on) or 0 (off). In Schedule control, set the TTL and relay fields from the **TIMED EVENTS** screen for the method being run. Appendix D describes TTL and relay control.	**1** (on) **0** (off)
INJ VLV	Displays, and lets you set, the position of the injection valve.	**L** (load) **I** (inject)

Screen Field	Description	Values
CS VLV	Displays, and lets you set, the position of the optional column switching valve. **Note:** The column switching valve option is not currently available for the AS50 (USB).	**A** (column A) **B** (column B)
INJ VLV 1 **INJ VLV 2** (simultaneous injection mode only)	If the AS50 is equipped with two injection valves (for simultaneous injections), these fields display, and let you set, the position of each valve. Injection valve #1 is the bottom valve and injection valve #2 is the top valve. See Appendix E for details about the simultaneous injection option.	**L** (load) **I** (inject)

C.4 Method Menu

Use the **METHOD MENU** to:

- Enter the number of the method to be created or edited

- Enter the number to save the method to

- Access the three method editing screens

```
METHOD MENU        EDIT  25     SAVE TO  25

1  SAMPLE PREP
2  SETUP
3  TIMED EVENTS


Help Prompt
```

Figure C-5. Method Menu

To open a method editing screen, move the cursor to the screen's number and press **Enter**. To return to this screen, press **Menu**.

> **NOTE** **A method can have a maximum of 100 steps. The total includes the sample prep steps, the method setup (which counts as one step), and the timed events steps. For example, a default method would have a total of four steps: one for the sample prep Wait step, one for the method setup, and two timed events (INIT and time 0.00).**

C.4.1 Sample Prep Screen

Use the **SAMPLE PREP** screen to specify a sequence of operations to be performed before the method's timed events.

NOTE See <u>Section 3.10.3</u> for details about how to define sample prep steps.


```
                    SAMPLE PREP        METHOD:25
1    PIPET     20.0  uL     #SMP to  S+1
2    MIX       #SMP    250  uL 10    times
3    FLUSH      250  uL
4    WAIT
```

Help Prompt
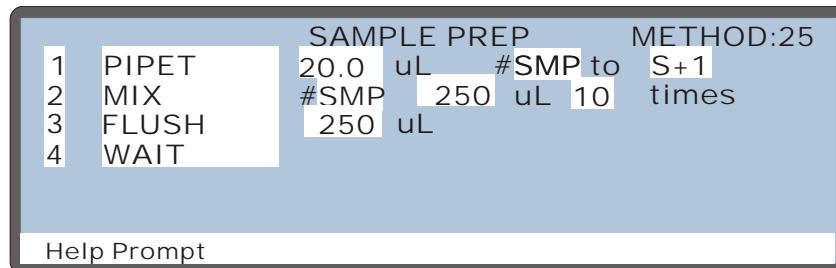
Figure C-6. Sample Prep Screen

Prep Operation	Description
DELAY	Specifies for how long the AS50 waits (0.0 to 999.9 minutes) before proceeding to the next step in the sample prep phase (default=0.0).
NEEDLE	The height of the needle above the bottom of the vial, from 0 to 46 mm (default=2 mm). The needle height is used for all pipet, dispense, and mix operations until a new height is specified.
	NOTE **For 0.3 mL and 1.5 mL vials, use a maximum needle height of 2 mm. This ensures the vent in the sampling needle is positioned correctly inside the vial.**
PIPET	Moves a specified volume of sample from one vial to another. The sample syringe is always used for pipetting.
	μ**L:** Enter the volume to pipet, from 1.0 to 99.9 μL (in 0.1 μL increments) or 100 to 1000 μL (in 1 μL increments) (default=20 μL).
	#: Enter the source vial position (the vial from which to pick up the specified volume) (default=**S+1**). See below for how to enter vial positions.
	to #: Enter the destination vial position (the vial to receive the volume of sample) (default=**SMP**).

Prep Operation	Description
	To enter vial positions:
	• Press numeric buttons to specify an absolute vial position from 1 to 100 (depending on the number of vial positions available in the currently installed tray), or
	• Press **Select** Δ or **Select** ∇ to cycle through a list of relative vial positions: **SMP** (the current sample vial), **S+1** (one position past the sample vial), or **S+9** (9 positions past the sample vial). The destination vial list also includes a **WST** (waste) option.
MIX	Mixes the vial contents by repeatedly drawing and expelling a volume of sample. Mixing is done with the prep syringe, if it is installed; otherwise, the sample syringe is used.
	#: Enter the position of the vial to be mixed (see above) (default =**SMP**).
	X: Enter the number of times to repeat the mixing operation, from 1 to 99 (default=10).
	u**L** Enter the volume to be drawn and expelled, from 1.0 to 9999 μL. The default is 500 μL if the prep syringe is installed; otherwise, it is 250 μL. The mix volume must be equal to or less than the syringe volume.
FLUSH	Flushes the needle with a specified volume, from 1 to 999 μL (default=250 μL). The sample syringe and flush reservoir are always used for flushing. If the volume specified is greater than the syringe volume, the syringe takes multiple strokes to achieve the volume.
	This operation is independent from the flush that takes place before each injection in a schedule (see Section 2.6.6).
DISPENSE	Moves a specified volume of reagent from a reservoir to a vial using the prep syringe. **DISPENSE** is available only if the sample preparation option is installed.
	μ**L**: Enter the volume to dispense, from 100 to 9999 μL (default=1000 μL).
	source: Select the reservoir from which to dispense the reagent: **RES A, RES B, RES C**, or **RES D** (default=**RES A**).
	to #: Enter the destination vial position (the vial to receive the dispensed volume) (default=**SMP**).

Prep Operation	Description
DILUTE	Dilutes a volume of concentrate with a specified volume of diluent. **DILUTE** is available only if the sample preparation option is installed.

μ**L:** Enter the concentrate volume, from 1.0 to 99.9 μL or 100 to 1000 mL (default=10 μL).

 #: Enter the source vial. The sample syringe picks up the concentrate from the source vial and dispenses it to the destination vial (default vial=**S+1**).

μ**L:** Enter the diluent volume (default=1000 μL).

source: Select the reservoir from which to dispense the diluent: **RES A, RES B, RES C**, or **RES D** (default=**RES A**).

to # : Enter the destination vial position (the vial to receive the concentrate and diluent volumes) (default vial=**SMP**).

| **WAIT** | The AS50 waits for a continue command before proceeding with the method. The command can be from the front panel (pressing **Hold/Run**) or a TTL input. Each method must have one wait step and no more. Sample prep operations can be added before and after the wait step. By default, the wait step is at the end of the sample prep phase.
The wait step can be disabled from the **SYSTEM PARAMETERS** screen (see Section C.6.5). |

C.4.2 Method Setup Screen

Use the **METHOD SETUP** screen to set the initial conditions and default parameters for a method.

```
METHOD SETUP      METHOD: 25

                 CYCLE TIME: 123  min
         SAMPLE NEEDLE HEIGHT: 46   mm
    SAMPLE TRAY TEMPERATURE: 20   °C
         COLUMN TEMPERATURE: --   °C
       WAIT FOR TEMP  STABLE: YES
Help Prompt
```
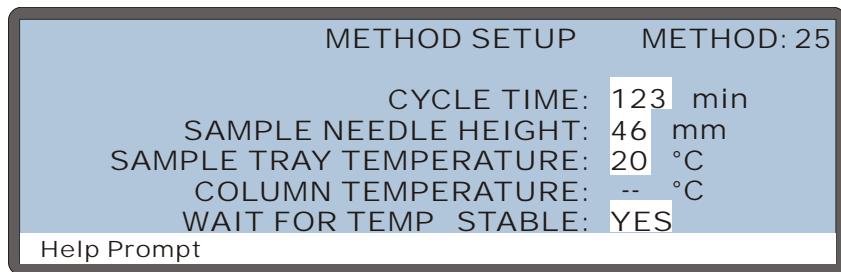
Figure C-7. Method Setup Screen

Screen Field	Description	Values
CYCLE TIME	The time between injections. When a method is assigned a cycle time, its timed events are not executed until the specified time has elapsed. See Section 2.6.5 for details. Cycle time is ignored in the following situations: • If **WAIT FOR TEMP STABLE** is enabled and the tray or column temperature has not stabilized by the end of the cycle time. • If the wait step of the method's sample prep phase is enabled and a continue command has not occurred by the end of the cycle time.	1 to 240 minutes (default=off)
SAMPLE NEEDLE HEIGHT	Controls the height of the sample needle above the bottom of the vial.	0 to 46 mm (default=2)

> **NOTE** **For 0.3 mL and 1.5 mL vials, use a maximum needle height of 2 mm to ensure the vent in the needle is positioned inside the vial.**

Screen Field	Description	Values
SAMPLE TRAY TEMPERATURE	The sample tray temperature set point. Pressing **Select** Δ or **Select** ∇ toggles the tray temperature control on and off. Available only when the sample temperature control option is installed.	4 to 60 °C (default=off) (default set point=20)
COLUMN TEMPERATURE	This field is for support of the thermal compartment option, which is not currently available.	
WAIT FOR TEMP STABLE	Specifies whether the AS50 should wait until the temperature of the sample tray has stabilized before continuing.	**YES/NO**

C.4.3   Timed Events Screen

Use the **TIMED EVENTS** screen to specify a sequence of events after the method's sample prep phase is completed.

		TIMED EVENTS			METHOD: 25	
TIME	**VALVE**	**CSV**	**TTL1**	**TTL2**	**RLY1**	**RLY2**
INIT	**LOAD**	**A**	**0**	**0**	**0**	**0**
0.00	**INJECT**					

Help Prompt
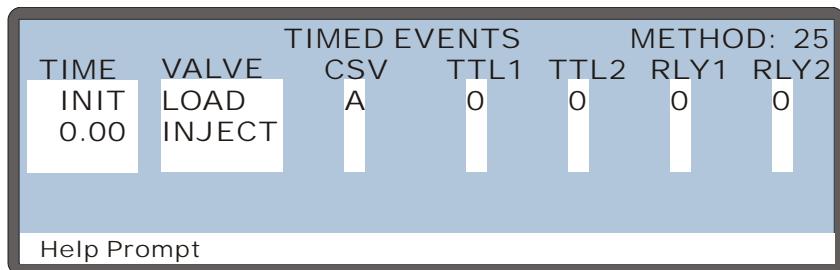
Figure C-8. Timed Events Screen

When entering timed event parameters:

- Press **Select** Δ or **Select** ∇ to select a value.

- Press **Delete** to clear a value from a field. When a field is blank, the value from the previous step remains in effect.

Screen Field	Description	Values
TIME	The elapsed time at which the method step starts. Every method begins with an **INIT** (initial) step and a **TIME = 0.00** step. You can edit the events for these steps, but cannot delete them. The initial step occurs when the timed events for the previous injection have ended.	0 to 999.99 minutes
VALVE	Controls the position of the injection valve in the IC system module. An AS50 TTL output must be connected to a TTL input on the IC system module. See Appendix D for details about TTL connections. Only one **LOAD** and one **INJECT** command can be specified in a method. Sample loading must occur before the injection. By default, **LOAD** occurs at the **INIT** step and **INJECT** occurs at **TIME = 0.00**.	**LOAD/ INJECT**

NOTE   **If the schedule specifies an injection per vial of 0, then only the method's sample prep phase of steps occurs.**

Screen Field	Description	Values
VALVE1 VALVE2 (simultaneous injection mode only)	If the AS50 is equipped with, or connected to, two injection valves (for simultaneous injections), these fields are used to select the position of each valve. Injection valve #1 is the bottom valve and injection valve #2 is the top valve. Specify one **LOAD** and one **INJECT** command for each valve. Sample loading must occur before the injection. By default, **LOAD** occurs at the **INIT** step and **INJECT** occurs at **TIME = 0.00**. See Appendix E for details about the simultaneous injection option.	**LOAD/ INJECT**
CSV	The position of the optional column switching valve. **Note:** The column switching valve option is not currently available for the AS50 (USB). Use the default setting (**A**) for this field.	**A** (column A) (default) **B** (column B)
TTL1, TTL2 RLY1, RLY2	Provides TTL and relay control of other devices. See Appendix D for details.	**1** (on) **0** (off)

C.5 Schedule Screen

Use the **SCHEDULE** screen to program a sequence of injections.

```
SCHEDULE        EDIT  1     SAVE TO  1      RUN 1
MISSING VIAL ACTION:     SKIP
              VIAL#        INJ/      INJ
LINE    START- END        VIAL    VOL(uL)    METHOD
 1-4        1  -  4         3       25.0         1
  5         5  -  5         1       25.0         1
  6         6  -  6         1        5.0         1
Help Prompt
```

Figure C-9. Schedule Screen

Screen Field	Description	Values
EDIT	The schedule number to edit. Press a numeric button to select the number or press **Select** Δ or **Select** ∇ to cycle through the choices. Press **Enter** to display the selected schedule.	1 to 9
SAVE TO	The schedule number to save the current schedule to. It does not have to be the **EDIT** number.	1 to 9
RUN	The schedule number to run. **Note**: Entering a value in this field does not start the schedule. Press **Hold/Run** or send a TTL/RLY run command to start.	1 to 9
Missing Vial Action	The action the AS50 takes if a vial is missing from the tray. Select **SKIP** to ignore the missing vial and move to the next vial in the schedule. Select **STOP** to stop the schedule. To resume, press **Hold/Run**.	**SKIP/STOP (default=STOP)**
LINE	Each line contains the parameters for one vial in the schedule. Line numbers are assigned automatically when you insert steps. (A step is one horizontal line on the **SCHEDULE** screen.) If consecutive vials have identical parameter values, line numbers are shown in a range format (see the example above). A schedule can have a maximum of 203 steps, containing up to 999 lines.	1 to 999 (automatically assigned)

Screen Field	Description	Values
VIAL# START END	The first and last vial numbers for the schedule step. The vials in this range are sampled according to the parameters specified in the step. The starting vial does not have to be a smaller number than the ending vial. To sample just one vial, enter the same vial number for the start and end.	1 to 100 (1.5 mL tray) 1 to 49 (plastic 10 mL tray)
INJ/VIAL	The number of injections performed on each vial. If zero injections is specified, only the sample prep portion of the method will be performed.	0 to 99 (default=1)
INJ VOL (μL) (non-simultaneous injection mode)	The volume of sample delivered for each injection. The maximum injection volume depends on the loop size installed. The volume entered determines whether the injection is a full-loop; partial-loop; or partial-loop, limited-sample. See Section 3.12 for details.	1.0 to 99.9 μL 100 to 1000 μL (default=25)
INJ VOL (μL) (simultaneous injection mode)	If the AS50 is equipped with two injection valves (for simultaneous injections), the injection volume is loaded into the sample syringe and then delivered equally to the two sample loops. See Appendix E for details about the simultaneous injection option.	1000 to 5000 μL (with 5 mL syringe) 1000 to 8000 μL (with 10 mL syringe) (default=1000 μL)
METHOD	The method number to run on each vial in the range.	1 to 99

C.6   Module Setup Menu


```
              MODULE SETUP MENU

  1  INSTALLED OPTIONS    6  INJECT PORT ALIGN
  2  FRONT PANEL          7  INTERLOCK BYPASS
  3  PLUMBING CONFIGURATION
  4  TIME/DATE
  5  SYSTEM PARAMETERS
Help Prompt
```
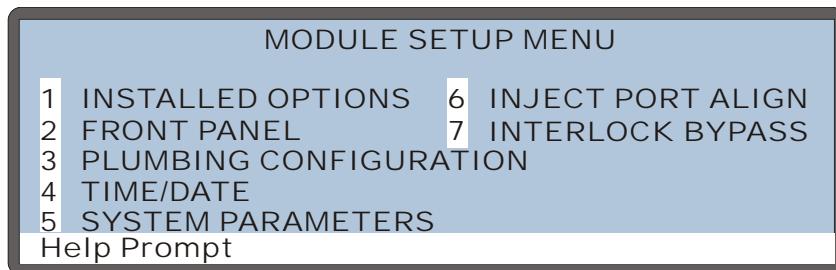
Figure C-10. Module Setup Menu Screen

C.6.1   Installed Options Screen

The **INSTALLED OPTIONS** screen lists the optional features installed in the AS50. The AS50 automatically detects which options are installed and displays a check mark in the appropriate fields. This screen is displayed briefly at power-up.


```
              INSTALLED OPTIONS

  SAMPLE TRAY TEMPERATURE CONTROL  [√]
      COLUMN TEMPERATURE CONTROL   [ ]
              SAMPLE PREPARATION   [√]
          COLUMN SWITCHING VALVE   [ ]
                  INJECTION VALVE  [√]  PEEK
Help Prompt
```
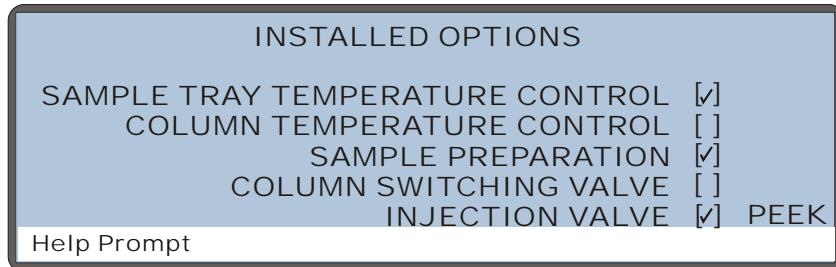
Figure C-11. Installed Options Screen

NOTES

• The **COLUMN TEMPERATURE CONTROL** and **COLUMN SWITCHING VALVE** options are not currently available for the AS50 (USB).

• If the simultaneous injection option is installed, two injection valves are shown on the screen.

• The injection valve option is always enabled, even if a valve is not installed in the autosampler compartment. This allows all injection valve commands issued from Chromeleon to control the valve in the IC system (ICS-1000, ICS-1500, ICS-2000).

C.6.2 Front Panel Screen

Use the **FRONT PANEL** screen to select display options.

```
                    FRONT PANEL

    DISPLAY PANEL BACKLIGHT: HIGH
       KEY ACTUATION SOUND: OFF
         ENTRY ERROR SOUND: ON
             HELP LANGUAGE: ENGLISH

 Help Prompt
```
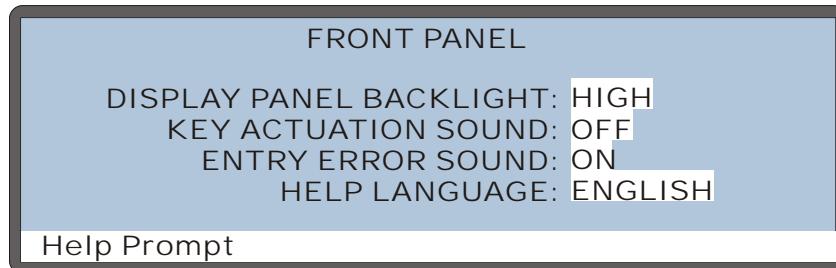
Figure C-12. Front Panel Screen

Screen Field	Description	Values
DISPLAY PANEL BACKLIGHT	Selects the brightness of the display panel backlight. The off option darkens the display completely. When off, press any button to turn the light on again.	**LOW/MEDIUM/ HIGH/OFF** (default=**HIGH**)
KEY ACTUATION SOUND	Toggles the key sound on and off.	**ON/OFF** (default=**OFF**)
ENTRY ERROR SOUND	Toggles the error sound on and off.	**ON**/**OFF** (default=**OFF**)
HELP LANGUAGE	Selects the language for help and error messages.	**ENGLISH/ JAPANESE**

C.6.3 Plumbing Configuration Screen

Use the **PLUMBING CONFIGURATION** screen to specify the plumbing options installed in the AS50.

```
            PLUMBING CONFIGURATION
              INJECT VALVE:   PEEK
                 LOOP SIZE:    25   uL
     SAMPLE SYRINGE VOLUME:   250  uL
     SAMPLE SYRINGE CONFIG:   READY
       PREP SYRINGE VOLUME:   2.5   mL
       PREP SYRINGE CONFIG:   READY
   Help Prompt
```
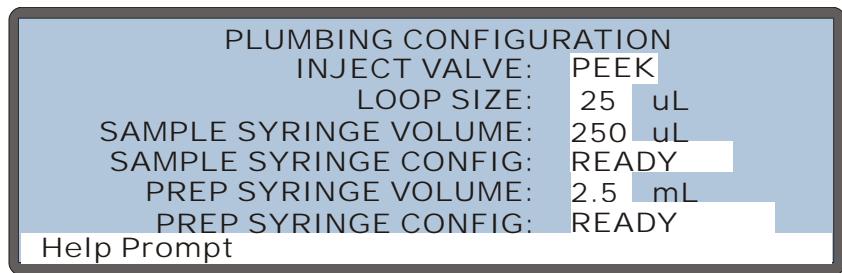
Figure C-13. Plumbing Configuration Screen

Screen Field	Description	Values
INJECT VALVE	The injection valve material.	**PEEK**
LOOP SIZE	The size of the loop(s) installed.	2 to 99.9 μL 100 to 1100 μL (default=25)
SAMPLE SYRINGE VOLUME	The volume of the sample syringe installed. Press **Select** Δ or **Select** ∇ to cycle through the choices. If the AS50 is equipped with the simultaneous injection option, 5000 and 10000 μL sizes are added. See Appendix E for details.	100 μL, 250 μL, 500 μL, 1000 μL (default=250) For simultaneous injection mode only: 5000 μL, 10,000 μL (default=5000)
SAMPLE SYRINGE CONFIG	The action to be performed by the sample syringe. These actions are used to configure the syringe at initial setup or after a new syringe is installed. **INITIALIZE** brings the syringe to an initial position. **SET HOME** sets the topmost position the syringe will reach during operation. **READY** is displayed when syringe configuration is complete; no action occurs. See Section 5.2 for details.	**SET HOME INITIALIZE READY**

Screen Field	Description	Values
PREP SYRINGE VOLUME	The volume of the prep syringe installed. Press **Select** Δ or **Select** ∇ to cycle through the choices.	2.5 mL, 5 mL, 10 mL (default=5)
PREP SYRINGE CONFIG	The action to be performed by the prep syringe. See the **SAMPLE SYRINGE CONFIG** section for details.	**SET HOME INITIALIZE READY**

C.6.4   Time/Date Screen

Use the **TIME/DATE** screen to set the time and date on the real-time clock.

```
                    TIME/DATE

        ACTUAL TIME:    12:35:00
          SET TIME:    12:34:56
              DATE:    16  JUNE  04


 Help Prompt
```

Figure C-14. Time/Date Screen

Screen Field	Description
ACTUAL TIME	Displays the time on the real-time clock.
SET TIME	Sets the 24-hour real-time clock. Enter the hour first, followed by minutes, and then seconds. For example, if the time is 8:35 a.m. and 50 seconds, enter 08:35:50. If the time is 8:35 p.m. and 50 seconds, enter 20:35:50. Press numeric buttons to enter the time directly, or press **Select** Δ or **Select** ∇ to increase or decrease the current value.
DATE	Sets the date on the real-time clock. Press numeric buttons to enter the day and year directly, or press **Select** Δ or **Select** ∇ to increase or decrease the current values. Press **Select** Δ or **Select** ∇ to select the month.

C.6.5   System Parameters Screen

Use the **SYSTEM PARAMETERS** screen to set default system operating parameters.

```
           SYSTEM PARAMETERS

              WAIT:   ENABLED
      SYRINGE SPEED:   4
CUT SEGMENT VOLUME:   10    uL
  INJECT PORT VOLUME:   43    uL
SRS POWER SWITCHING:   DISABLED
  Help Prompt
```
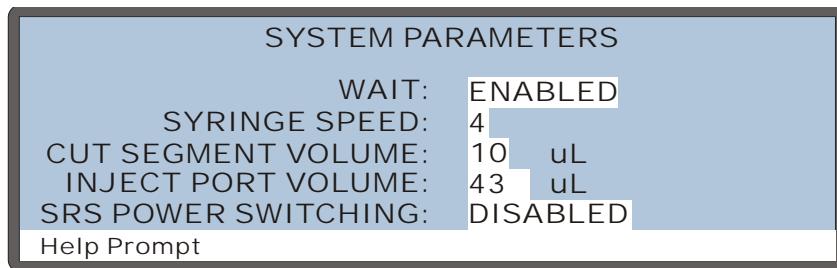
Figure C-15. System Parameters Screen

Screen Field	Description	Values
WAIT	Enables or disables the wait step in the sample prep phase of the method. When wait is enabled, the AS50 waits for a run command from either the front panel **Hold/Run** button or a TTL input signal before performing a method's timed events steps. This allows another instrument or Chromeleon to control the timing of each injection in a schedule. When wait is disabled, a run command is required to start a schedule. Thereafter, the AS50 performs the schedule lines without requiring additional run commands. Disabling wait allows the AS50 to act as a system master. The AS50 can send TTL signals to other modules in the system, thereby controlling system functions (starting the pump, starting the detector method, etc.).	**ENABLED** **DISABLED**
SYRINGE SPEED	The syringe speed to use. Select the default value of 5 for water; more viscous liquids require slower speeds.	1 (slowest) to 5 (fastest) (default=4)

Screen Field	Description	Values
CUT SEGMENT VOLUME	For partial-loop injections, specifies the volume to cut from each side of the sample during the injection process. See Section 3.11.5 for details about injection types.	0 to 30 µL (default=10)
INJECT PORT VOLUME	The volume of tubing between the inject port and injection valve. This represents the amount of extra liquid to be dispensed when loading the loop in order to accurately position the sample. This value is determined at the factory and should not be changed unless a new needle seal assembly is installed.	1 to 999 µL (default=25)
SRS POWER SWITCHING	Specifies whether to switch the power from one SRS to the other at the same time that the column switching valve position is switched. **Note:** The column switching valve option is not currently available for the AS50 (USB).	**ENABLED DISABLED**

C.6.6   Inject Port Alignment Screen

Use the **INJECT PORT ALIGNMENT** screen to align the sampling needle in the inject port. See Section 5.7 for detailed instructions.

```
          INJECT PORT ALIGNMENT

     X ADDRESS:      1340
     Y ADDRESS:      1930
     Z ADDRESS:       230


  Help Prompt
```
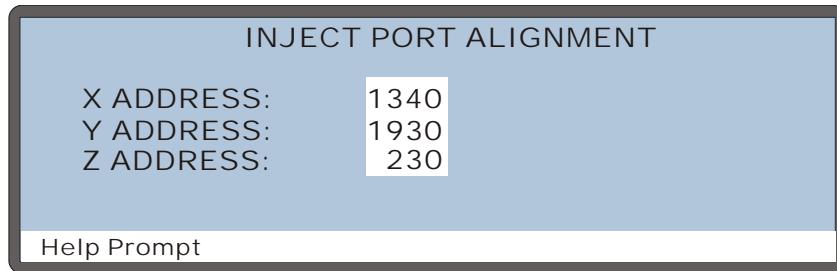
Figure C-16. inject Port Alignment Screen

Screen Field	Description	Values
X ADDRESS	The X-axis position of the needle arm.	1290 to 1390 (default=1340)
Y ADDRESS	The Y-axis position of the needle arm.	1880 to 1950 (default=1930)
Z ADDRESS	The Z-axis position of the needle arm.	180 to 280 (default=230)

C.6.7 Door Interlock Bypass Screen

Use the **DOOR INTERLOCK BYPASS** screen to temporarily disable the autosampler compartment door lock.

```
       DOOR INTERLOCK BYPASS

DOOR INTERLOCK BYPASS   YES

NOTE: Afer setting bypass you have a
15 minute window to perform operations
with the sample door open.
Help Prompt
```

Figure C-17. Door Interlock Bypass Screen

CAUTION

Be aware of unexpected sampling arm movement when operating with the door open.

MISE EN GARDE

Soyez conscient de la possibilité de mouvements imprévus du bras d'échantillon lorsqu'il est utilisé avec la porte ouverte.

VORSICHT

Achten Sie beim Betrieb mit geöffneter Tür auf unerwartete Bewegungen des Probenarms.

Screen Field	Description
DOOR INTERLOCK BYPASS	Press **Select** Δ or **Select** ∇ to select **YES** (bypass the door lock) or **NO** (do not bypass the door lock) and press **Enter**. The default setting is **NO**.
	After selecting **YES** and pressing **Enter**, the door lock alarm is disabled for 15 minutes. If you open the autosampler compartment door during this time, the sampling arm continues its current operation; if a schedule is running, it continues also. To extend the bypass for another 15 minutes, press **Enter** again. This restarts the 15-minute window.
	When the 15 minutes is up, the **DOOR INTERLOCK BYPASS** setting automatically reverts to **NO**. When **NO** is selected, opening the autosampler compartment door stops the sampling arm operation and aborts the currently running schedule.

C.7 Flush/Prime Screen

Use the **FLUSH/PRIME** screen to:

- Set the parameters and initiate a flush cycle that flushes the inject port and washes the outside of the needle.

- Set the parameters and initiate a prime cycle that primes the lines to the reservoir(s) and the sampling needle.

```
                    FLUSH/PRIME
          FLUSH                      PRIME
     VOLUME:   250  uL       VOLUME:  2000  uL
  RESERVOIR: FLUSH        RESERVOIR: RES A
    SYRINGE: SAMPLE         SYRINGE: PREP
     ACTION: READY           ACTION: READY

  Help Prompt
```
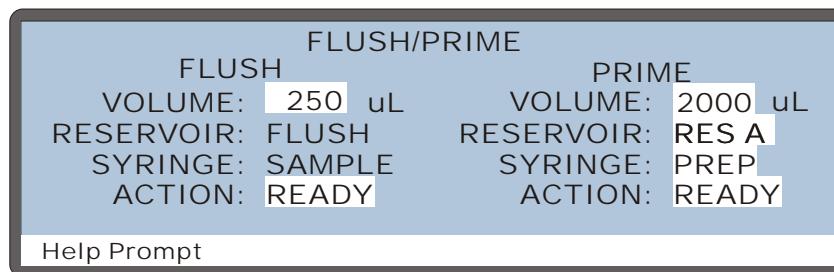
Figure C-18. Flush/Prime Screen

Screen Field	Description	Values
FLUSH VOLUME	The volume of fluid used to flush the inject port. The inject port is flushed, using the volume specified, and then the exterior of the needle is washed, using a factory-set volume.	100 to 9999 μL (default=250)
FLUSH RESERVOIR	The flush reservoir is always used for flushing.	**FLUSH**
FLUSH SYRINGE	The sample syringe is always used for flushing.	**SAMPLE**
FLUSH ACTION	To start a flush cycle, press **Select** Δ or **Select** ∇ to select **FLUSH** and press **Enter**. The AS50 must be in Direct Control mode before starting the flush cycle.	**READY, FLUSH**
PRIME VOLUME	The volume of fluid used for priming.	100 to 5000 μL (default=400)

Screen Field	Description	Values
PRIME RESERVOIR	The reservoir used for the priming cycle. If the sample preparation option is installed, press **Select** Δ or **Select** ∇ to cycle through the choices. If the sample preparation option is not installed, the flush reservoir is always used and this field cannot be edited.	**FLUSH, RES A, RES B, RES C, RES D**
PRIME SYRINGE	The syringe used for the prime cycle. If the sample preparation option is not installed, the sample syringe is always used and this field cannot be edited.	**SAMPLE, PREP**
PRIME ACTION	To start a prime cycle, press **Select** Δ or **Select** ∇ to select **PRIME** and press **Enter**. The AS50 must be in Direct Control mode before starting the prime cycle.	**READY, PRIME**

C.8 Time Function In Screen

Use the **TIME FUNCTION IN** screen to:

- Display the AS50 functions that can be controlled via TTL input from another device

- Select a TTL signal mode for each function

See Appendix D for details about TTL-controlled functions and connections.

```
                         TIME FUNCTION IN

                              TTL        MODE
               UNUSED:        1
       START-CONTINUE:        2     NORMAL    EDGE
     TRAY TEMP ON/OFF:        3
   COLUMN TEMP ON/OFF:        4
    Help Prompt
```
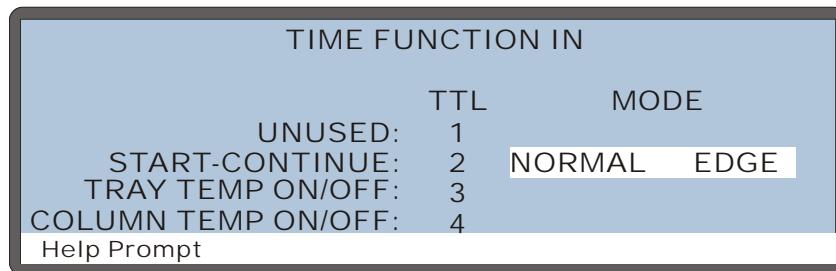
Figure C-19. Time Function In Screen

Screen Field	Description	Values
MODE	Select the signal mode that corresponds to the signal type of the controlling device. **NORMAL EDGE**, the default mode, is compatible with the TTL output signals provided by Dionex modules.	**NORMAL EDGE** **INVERTED EDGE** **NORMAL PULSE** **INVERTED PULSE**
UNUSED:TTL1	Not active.	
START-CONTINUE: TTL2	A signal to TTL2 from the controlling device starts the schedule (if it is not currently running), or continues the current schedule when the AS50 is at the wait step of a method.	
TRAY TEMP ON/OFF: TTL3	A signal to TTL3 from the controlling device turns the optional sample temperature control unit on and off.	
COLUMN TEMP ON/OFF: TTL4	This TTL is for support of the thermal compartment option, which is not currently available.	

C.9   Diagnostic Menu

To go to the **DIAGNOSTIC MENU**, press **Menu** and **8**.

```
              DIAGNOSTIC MENU

    1  POWER-UP SCREEN      6  LOGS MENU
    2  DIAGNOSTIC TESTS     7  LEAK CAL & STATUS
    3  XYZ TEST             8  KEYBOARD TEST
    4  TEMP STATISTICS      9  CODE VERSIONS
    5  LIQUID CONTROL
   Help Prompt
```
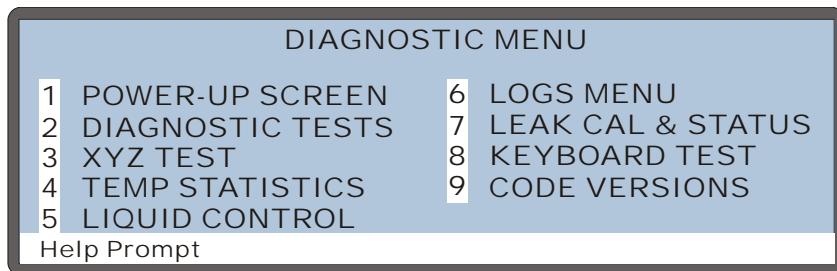
Figure C-20. Diagnostic Menu Screen

C.9.1   Power-Up Screen

Use the **POWER-UP** screen to display the revision levels of the
Moduleware and USB BIOS code, the module's ID number (if
connected), and the serial number of the AS50. This is the same power-up
screen that displays when you turn on the AS50.

```
          AutoSelect AS50 AUTOSAMPLER


            MODULEWARE REV   n.nn
               USB BIOS REV   n.nn
                MODULE ID#   nnnnnn
          AS50 SERIAL NUMBER   nnnnnnnn
   Help Prompt
```
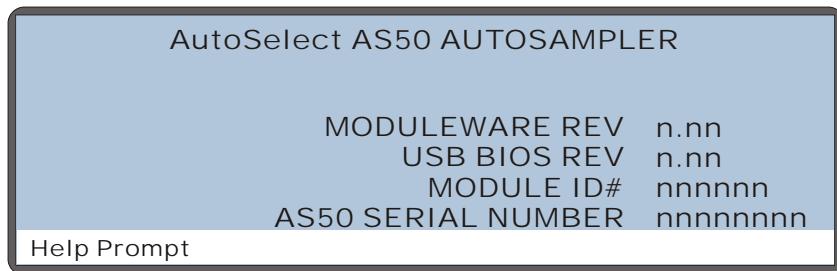
Figure C-21. Power-Up Screen

C.9.2 Diagnostic Tests Screen

This screen lets you test the AS50 electronics components.

DIAGNOSTIC TESTS

P	**CPU**	**P**	**DSP COMM**	**P**	**SYRINGE COMM**
P	**LEAKS**	**P**	**XYZ HOME**	**P**	**INTERLOCK**
				P	**INJECT VALVE**

Help Prompt
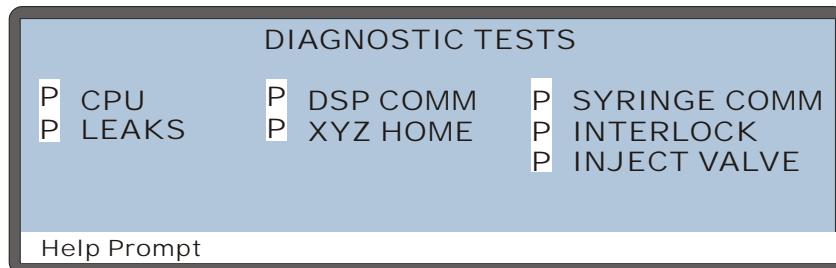
Figure C-22. Diagnostic Tests Screen

At power-up, these tests are run automatically. If any tests fail, the screen is displayed and indicates the status of each test:

"--" The test was not run
">" The test is in progress
"P" The test passed
"F" The test failed

To run a test manually, position the cursor in the edit field next to the test, press **Select** Δ or **Select** ∇ to select the asterisk (*), and press **Enter**.

Test	Description
CPU	Checks the CPU internal configuration and the Moduleware checksum.
LEAKS	Checks whether the leak sensors detect a leak.
DSP COMM	Checks communication between the CPU and the DSP (Digital Signal Processor) hardware.
XYZ HOME	Tells the DSP to search for the XYZ home position.
SYRINGE COMM	Checks the communication between the CPU and the sample syringe.
INTERLOCK	Checks that the autosampler door is closed.
INJECT VALVE	Checks that the injection valve operates correctly.
INJECT VALVE 1 INJECT VALVE 2 (simultaneous injection mode)	If the AS50 is equipped with two injection valves (for simultaneous injections), these tests check that each valve operates correctly.

C.9.3   XYZ Test Screen

Use the **XYZ TEST** screen to test operation of the sampling needle arm.

```
                    XYZ TEST
                              X      Y      Z
ACTION:  CYCLE      ACTUAL: 1234   5678    901
X SENSOR:  0             1: 1234   5678    901
Y SENSOR:  1             2:    0      0      0
Z SENSOR:  0             3:    0      0      0
   Z HOME: 1             4:    0      0      0
Help Prompt
```
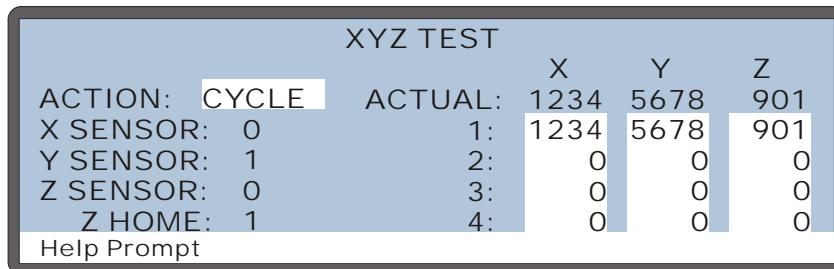
Figure C-23. XYZ Test Screen

Screen Field	Description
ACTION	The action the needle arm should perform:
	HOME Homes all three axes.
	GO TO X Positions the arm at the specified location (1, 2, 3, or 4).
	CYCLE Continuously cycles the arm through the four positions.
	PATTERN Continuously cycles through a four corners test pattern, with the needle moving about halfway into the vial.
	VIALS Continuously cycles the arm through each position in the currently installed tray, with the needle tapping the top of each vial.
ACTUAL XYZ	Displays the needle arm's current XYZ position. The numbers indicate the number of motor steps away from the home position.
XYZ 1, 2, 3, 4	Allows entry of XYZ values for four needle arm positions. The numbers indicate the number of motor steps away from the home position.
X SENSOR Y SENSOR	Indicates the current state of the X and Y sensors. The X and Y sensors detect evenly spaced slots that indicate the home position and mark distance intervals.
Z SENSOR	Indicates whether a vial is present. When the needle is down and a vial is present, "1" is displayed. If no vial is present at the current location when the needle is down, "0" is displayed.

Screen Field	Description
Z HOME	Indicates whether the Z axis is at the home position. An entry of "0" indicates home.

To run a test:

1. Move the cursor to the **ACTION** field and select an action to perform. For the **GO TO** action, enter the desired xyz positions.

2. Press **Enter**.

C.9.4   Temperature Statistics Screen

Use the **TEMPERATURE STATISTICS** screen to:

- Manually control the temperature of the optional tray compartment

- Monitor the status of temperature-related values

> **NOTE** **This screen is available only when the temperature control option is installed.**

```
          TEMPERATURE STATISTICS
 MIN:  0.1  A  MAX: 10.2  A   TIME:  12:34:56
TRAY SET TEMP: 35  °C     COL SET TEMP:  °C
   ACTUAL: 35.0  °C=       ACTUAL:
* PELTIER: 10.0   A        PELTIER:
   CONTROL: 07  HEX        CONTROL:
  DUTY CYC: 123           DUTY CYC:
  Help Prompt
```
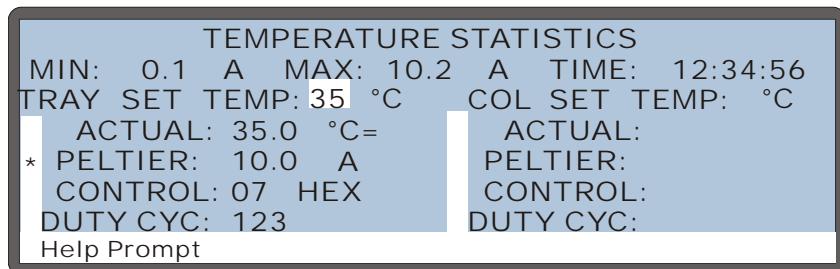
Figure C-24. Temperature Statistics Screen

Screen Field	Description
MIN, MAX, TIME	Displays the minimum and maximum values measured for the selected value, and the length of time the value has been monitored. An asterisk indicates the value being monitored. To select a value to monitor, move the cursor to the desired field and press **Enter**.
TRAY SET TEMP COL SET TEMP	The temperature to maintain in the tray. **Note:** The **COL SET TEMP** fields are for support of the thermal compartment option, which is not currently available.
ACTUAL	Displays the measured temperature. The reading is updated every 3 seconds. A symbol to the right of the reading indicates the temperature's status: = The temperature is stabilized ↑ The temperature is increasing ↓ The temperature is decreasing
PELTIER	Displays the measured Peltier currents.

Screen Field	Description
CONTROL	Displays the state of the Peltier control bits:
	bit 0: Saturate (0=duty cycle, 1=saturate) bit 1: Peltier enable (1=on) bit 2: Heat/cool (0=heat, 1=cool) bits 3-7: Always 0
DUTY CYCLE	Displays the Peltier duty cycle (from 0 through 255).

C.9.5   Liquid Control Screen

Use the **LIQUID CONTROL** screen to:

- Manually control the sample and prep syringes

- Manually control the inject valve

- Manually position the needle at a specified vial

The AS50 must be in Local mode, Direct Control to manually control these functions.

```
                    LIQUID CONTROL

       VIAL#:   1           NEEDLE  HEIGHT:   46
     ASPIRATE:    100   uL  from   NEEDLE
     DISPENSE:    100   uL SYRINGE SPEED:   4
      SYRINGE:  SAMPLE         INJ VALVE:   LOAD
       ACTION:  ASPIRATE       CS VALVE:   A
      Help Prompt
```
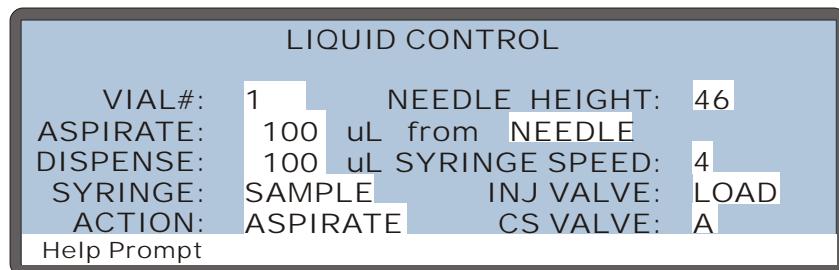
Figure C-25. Liquid Control Screen

```
                    LIQUID CONTROL

       VIAL#:   1           NEEDLE  HEIGHT:   46
     ASPIRATE:    100   uL  from   NEEDLE
     DISPENSE:    100   uL SYRINGE SPEED:   4
      SYRINGE:  SAMPLE         INJ VLV 1:   LOAD
       ACTION:  ASPIRATE       INJ VLV 2:   LOAD
      Help Prompt
```
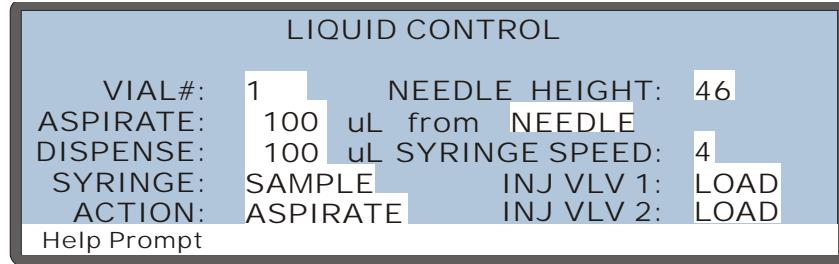
Figure C-26. Liquid Control Screen: Simultaneous Injection Mode

Screen Field	Description	Values
VIAL#	The position for the sampling needle. Press **Select** Δ or **Select** ∇ to cycle through vial numbers and options. Use numeric buttons to enter an absolute vial number. The range of valid vial numbers depends on the type of tray currently installed. Press **Enter** to move the needle to the selected position.	Absolute vial numbers (default=1), **INJ** (inject port), **FLU** (flush port)

Screen Field	Description	Values
ASPIRATE	The volume of liquid to be drawn during an aspirate action.	1.0 to 99.9 μL or 100 to 1000 μL (default=100 μL)
from	The source for the action. The choices depend on the syringe in use: Sample: **NEEDLE, FLUSH** Prep: **NEEDLE, FLUSH, RES A, RES B, RES C, RES D, AIR**	
DISPENSE	The volume of liquid to dispense during a dispense action.	1.0 to 99.9 μL or 100 to 1000 μL (default=100 μL)
SYRINGE	The syringe to use for an action.	**SAMPLE, PREP**
ACTION	The action to perform. Press **Select** Δ or **Select** ∇ to cycle through the choices; press **Enter** to start the action.	**ASPIRATE, DISPENSE, EMPTY, FILL**
NEEDLE HEIGHT	The height of the needle above the bottom of the vial. If 0 is selected, a small distance is added to prevent the needle from touching the bottom of the vial.	0 to 46 mm (default=46 mm)
SYRINGE SPEED	The syringe speed to use. Use a value of 5 for water. More viscous liquids require slower speeds.	1 (slowest) to 5 (fastest) (default=4)
INJ VALVE	The injection valve position.	**INJECT, LOAD**
CS VALVE	The position of the optional column switching valve. **Note:** The column switching valve option is not currently available for the AS50 (USB).	**A** (column A) (default), **B** (column B)
INJ VLV 1 INJ VLV 2 (simultaneous injection mode)	If the AS50 is equipped with two injection valves (for simultaneous injections), these fields select the position of each valve. Injection valve #1 is the bottom valve and injection valve #2 is the top valve.	**INJECT, LOAD**

C.9.6   Logs Menu

```
               LOGS MENU

  1  USAGE LOG
  2  MESSAGE LOG



 Help Prompt
```

Figure C-27. Logs Menu Screen

Usage Log Screen

Use the **USAGE LOG** screen to:

- Display for how long various AS50 components have been in use

- Reset counters after replacing a component

The status of each parameter is updated in real time.

```
               USAGE LOG
                              RESET
      MODULE ON:  nnnnnn hours
      BACKLIGHT:  nnnnnn hours
  NUMBER OF INJ:  nnnnnn injects
 SAMP SYRINGE USE:  nnnnnn cycles   *
 PREP SYRINGE USE:  nnnnnn cycles
 Help Prompt
```
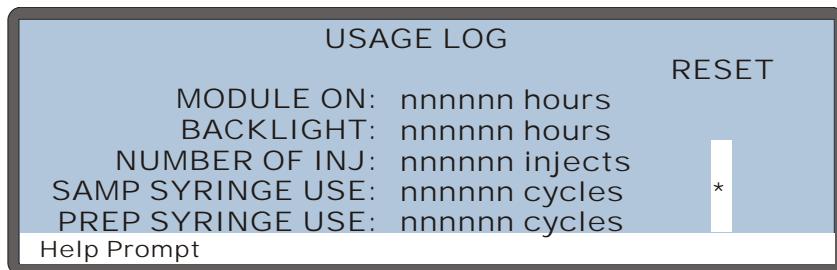
Figure C-28. Usage Log Screen

Screen Field	Description
MODULE ON	The number of hours the AS50 has been powered-up.
BACKLIGHT	The number of hours the backlight has been on.
NUMBER OF INJ	The total number of injections. Reset the count after replacing the injection valve.
SAMP SYRINGE USE	The total number of aspirate/dispense cycles the sample syringe has performed. Reset the count after replacing the syringe.

Screen Field	Description
PREP SYRINGE USE	The total number of aspirate/dispense cycles the prep syringe has performed. Reset the count after replacing the syringe.
RESET	To reset the **NUMBER OF INJ**, **SAMP SYRINGE USE**, or **PREP SYRINGE USE** counter to 0, move the cursor to the corresponding asterisk (*) field and press **Enter**.

Message Log Screen

Displays a list of errors that have occurred.

```
                  MESSAGE LOG
1    11:22:33    29 SEPTEMBER 04        #208
     Incorrect key pressed
2    12:13:14    29 SEPTEMBER 04        #567
     Missing vial detected
3    15:67:02    29 SEPTEMBER 04        #331
     Method does not exist
Help Prompt
```

Figure C-29. Message Log Screen

Each message includes the time and date the message was recorded, the error code, and a brief description of the error.

To see a full-screen description of an error, move the cursor to the error's entry number and press **Help**.

Press **Select** Δ or **Select** ∇ to go to the beginning or ending of the log, respectively.

C.9.7   Leak Sensor Calibration and Status Screen

Use this screen to display the status of the leak sensors and to calibrate them.

```
    LEAK  SENSOR  CALIBRATION   AND  STATUS
                           TRAY           OVEN
         MEASURED VALUE:   2.48           - - - -
      CURRENT CONDITION:   DRY
       CALIBRATION VALUE:  2.49           - - - -
     LOW LEAK THRESHOLD:   2.29           - - - -
     ENABLE LEAK DETECTION YES
      Help Prompt
```
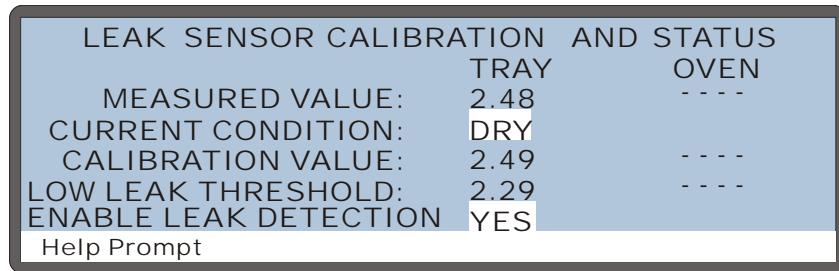
Figure C-30. Leak Sensor Calibration and Status Screen

Screen Field	Description
MEASURED VALUE	Reports the current measured voltages for the two leak sensors. **TRAY** is the sensor installed in the autosampler drip tray. The **OVEN** fields are for support of the thermal compartment option. **Note:** The thermal compartment option is not currently available.
CURRENT CONDITION	Reports the current state of the sensors: **DRY** if the sensor reading is within the dry range, **WET** if the sensor reading is within the wet range, or **ERR** if the sensor is out of range. If the measured value drops 0.02 volts below the calibration value, the current condition is wet. If the measured value goes 0.06 volts above the calibration value, the sensor needs to be recalibrated. To calibrate a sensor, press **Select** Δ or **Select** ∇ to select **CAL** and then press **Enter**. The current measured value becomes the new calibration value. See Section 5.10 for detailed instructions.
CALIBRATION VALUE	Reports the voltage values set for the calibration.
LOW LEAK THRESHOLD	Reports the minimum voltage reading that will be interpreted as a dry sensor. A reading below this voltage indicates a wet sensor.

C.9.8   Keyboard Test Screen

Use the **KEYBOARD TEST** screen to conduct an interactive test of the front panel keypad buttons.

STOP	HOLD/RUN	UP		7	8	9
		LEFT	RIGHT			
HOME	DOOR	DOWN		4	5	6
INSERT	SEL UP			1	2	3
DELETE	SEL DOWN	HELP	MENU	0	.	E
Help Prompt						
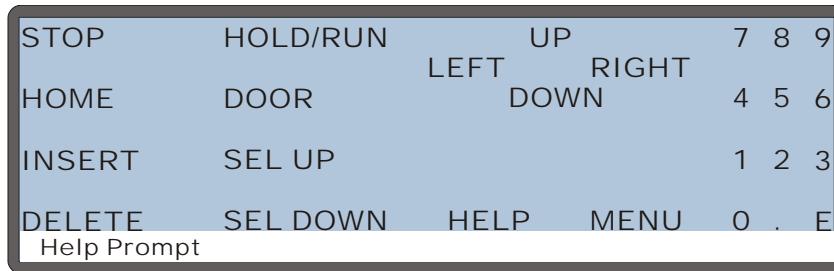
Figure C-31. Keyboard Test Screen

To test the buttons:

1. Press a button on the keypad. Its display changes to reverse video, confirming proper operation of that button.

2. Continue pressing all buttons in turn. Only the most recently pressed button shows in reverse video.

3. To end the test and return to the **DIAGNOSTIC MENU**, press **Menu** twice.

C.9.9 Code Versions Screen

Displays revision numbers for the current digital signal processor (DSP) code and syringe operating codes.

```
              CODE VERSIONS

                    DSP REV      n.nn
          SAMPLE SYRINGE REV     Xnnn
            PREP SYRINGE REV     Xnnn


  Help Prompt
```
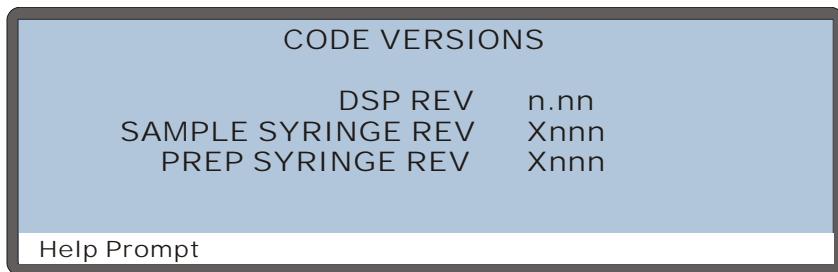
Figure C-32. Code Versions Screen

C.10 Print Menu

When a printer with a serial (RS-232) interface is connected, the **PRINT MENU** can be used to print a schedule, a method, setup and configuration information, or a message log. In addition, automatic schedule printouts can be enabled or disabled from here. The communication parameters for setting up the serial printer are listed on the next page.

```
              PRINT MENU

1   PRINT SCHEDULE
2   PRINT METHOD
3   PRINT SETUP/CONFIG
4   PRINT MESSAGE LOG
5   AUTOMATIC PRINTING:    DISABLED
Help Prompt
```
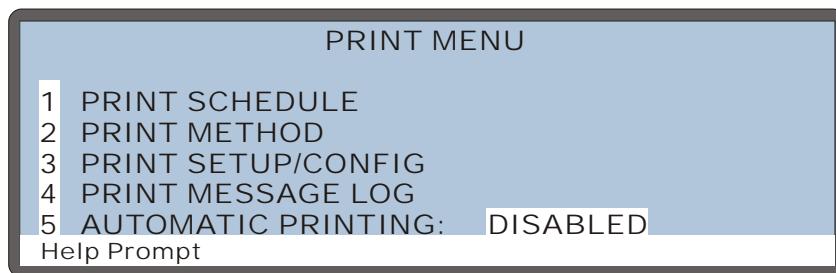
Figure C-33. Print Menu

Screen Field	Description
PRINT SCHEDULE	Displays a prompt screen on which you enter the schedule number to be printed.
PRINT METHOD	Displays a prompt screen on which you enter the method number to be printed.
PRINT SETUP/ CONFIG	Prints setup and configuration information.
PRINT MESSAGE LOG	Prints the message log (up to 20 messages).
AUTOMATIC PRINTING	Toggles between **DISABLED** and **ENABLED**. When enabled, schedule information will print automatically while the schedule is running.

RS-232 Interface Communication Parameters:

Parameter	Specification
Baud	9600
Mode	Full duplex
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	XON/XOFF
Connector	DB9 male jack

C.11 Time Function Out Screen

Use the **TIME FUNCTION OUT** screen to enable TTL control of an injection valve installed in an ICS-1000, ICS-1500, or ICS-2000.

```
                    TIME FUNCTION OUT

                         TTL           STATE
    LOAD/INJECT VALVE:    1          ENABLED
    LOAD/INJECT VALVE:    2          DISABLED


  Help Prompt
```
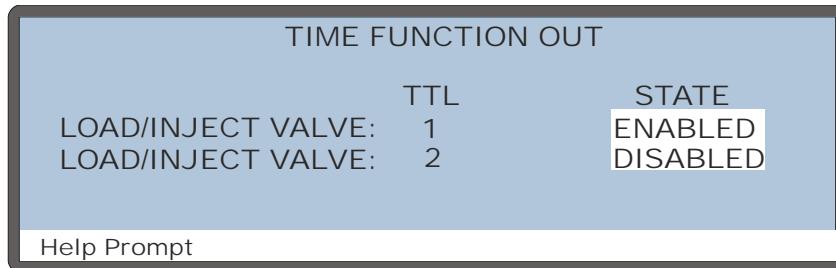
Figure C-34. Time Function Out Screen

Screen Field	Description	Values
LOAD/INJECT VALVE: TTL1, TTL2	If the AS50 is not connected to Chromeleon, a TTL connection is required between the AS50 TTL output and a TTL input on the IC system. This will allow you to control the injection valve in the IC system from the AS50 front panel. See Appendix D for TTL connection instructions.	**ENABLED/ DISABLED** **(default= TTL1 ENABLED)**

D • TTL and Relay Control

D.1 TTL and Relay Connections

A 12-pin connector strip for TTL/relay control is located on the AS50 rear panel. The connector provides two relay outputs, two TTL outputs, and four TTL inputs (see Figure D-1).

Connector Position	Function
1	Solid State Relay Contacts Output
2	
3	Solid State Relay Contacts Output
4	
5	TTL Output 1 (1 kΩ pull up to +5, 100 mA sink)
6	TTL Output 2 (1 kΩ pull up to +5, 100 mA sink)
7	TTL Input 1 — (unassigned)
8	TTL Input 2 — Start/Continue Schedule
9	TTL Input 3 — Tray Temperature ON/OFF
10	TTL Input 4 — Thermal Compartment ON/OFF
11	Ground
12	Ground

Figure D-1. TTL and Relay Connector on Rear Panel

⚠ **CAUTION**

Relay loads in excess of 200 mA or with included power supplies over 60 V may damage the relay drivers on the CPU.

The outputs can be used to control functions in external devices such as a Dionex IC system module. When connected to a controlling device, the inputs can be programmed to perform the following AS50 functions:

- Start and continue a schedule

- Turn the sample (tray) temperature control option on/off

> **NOTE** **The thermal compartment option is not currently available.**

Relay outputs 1 and 2 can be programmed to switch any low-voltage control. Switched current must be less than 200 mA and 42 V peak.

D.1.1 Connecting a TTL or Relay

1. Locate the twisted pair of wires (P/N 043598) and the 12-position connector plug (P/N 923686) (see Figure D-2) in the AS50 Ship Kit (P/N 061270 or P/N 061271).
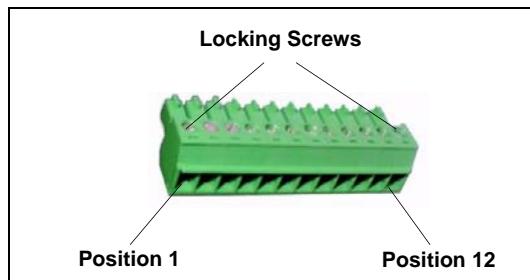
Figure D-2. 12-Position Connector Plug

2. Follow these basic steps to connect the TTL or relays.

   a. For each relay or TTL to be used, connect an active wire (red) and a ground wire (black) to the 12-position connector plug at the appropriate pin locations. Refer to Figure D-1 or the label on the AS50 rear panel for the connector pin assignments.

   b. To attach a wire to the plug, strip the end of the wire, insert it into the plug, and use a screwdriver to tighten the locking screw. If necessary, multiple ground wires can be attached to a single TTL input/output ground pin.

⚠ **CAUTION**

When attaching wires to the connector plug, be careful not to allow stray strands of wire to short to the adjoining position on the connector.

c. Plug the connector into the 12-pin connector on the AS50 rear panel.

d. Connect the wires from the AS50 connector plug to the TTL or relay connector pins on the other module(s). Additional connector plugs are provided with other Dionex modules.

NOTE **Check the polarity of each connection. Connect signal wires to signal (+) pins and ground wires to ground (-) pins.**

D.1.2 Selecting TTL Input Control Types

The AS50 TTL inputs respond to four types of signals to accommodate different controlling devices. The default control type, **Normal Edge**, is compatible with the output signals provided by Dionex modules.

If the device connected to the AS50 does not send a normal edge signal, select the appropriate control type. Refer to the documentation provided with the controlling device and the information below to select the correct type. Select a different control mode from the **TIME FUNCTION IN** screen (see Figure D-3).

TIME FUNCTION IN

	TTL	MODE
UNUSED:	1	
START-CONTINUE:	2	NORMAL EDGE
TRAY TEMP ON/OFF:	3	
COLUMN TEMP ON/OFF:	4	

Help Prompt
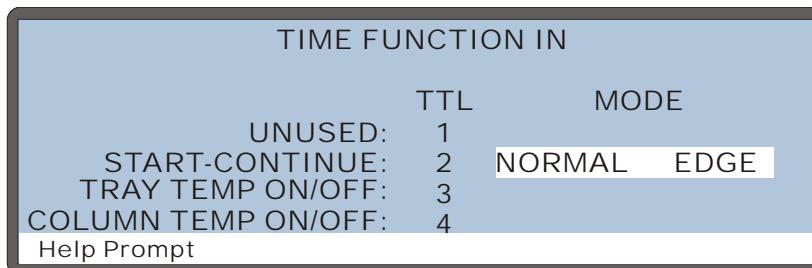
Figure D-3. Time Function In Screen–Selecting Signal Modes

TTL Input Control Types

• *Normal Edge*: In normal edge operation, the negative (falling) edge of a signal turns on the function. For example, for the **START-CONTINUE** function, the negative edge starts the
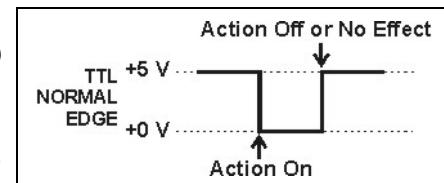
schedule (if it is not currently running), or continues the current schedule if it is on hold.

The action of the positive (rising) edge depends on the function: For the **START-CONTINUE** function, the rising edge has no effect. For the **TRAY TEMP ON/OFF** and **COLUMN TEMP ON/OFF** functions, the rising edge turns off sample temperature control and column temperature control. **Note:** The column temperature control option is not currently available for the AS50 (USB).

- *Inverted Edge*: The inverted edge mode works identically to the normal edge mode except that the positive and negative edges are reversed in function.

- *Normal Pulse*: In normal pulse operation, the negative (falling) edge of the TTL signal is the active edge and the positive (rising) edge is ignored.
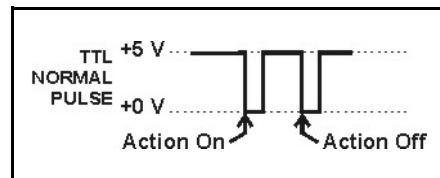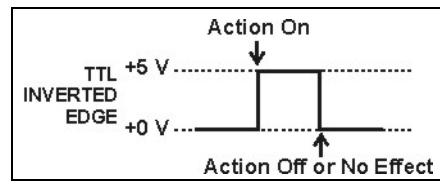
A pulse width of 50 ms or more is guaranteed to be detected. A pulse width of 4 ms or less is guaranteed to be ignored. The action for pulse widths that are greater than 4 ms and less than 50 ms is undefined.

- *Inverted Pulse*: The inverted pulse mode operates identically to the normal pulse mode except that the positive and negative edges are reversed in function.
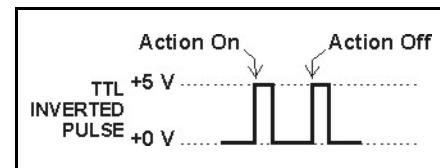
D.2 Controlling TTL and Relay Outputs

The AS50 provides two TTL outputs and two relay contacts for control of functions in external devices, such as an integrator. The relay outputs can be used to switch any low-voltage control. Switched current must be less than 200 mA and 60 V peak blocking. The relay-contact closures are normally open. When the relay is closed, current flows to the connected device.

> ⚠️ **CAUTION**
>
> **Relay loads in excess of 200 mA or with included power supplies over 60 V may damage the relay drivers on the CPU.**

The TTL outputs are normally at 5 volts. Setting a TTL output to 0 volts turns on the action in the connected device.

After connecting the TTL and Relay outputs (see Section D.1), toggle the output states on and off in Direct Control from the **DETAIL** screen (see Figure D-4), or in Schedule Control during the timed events portion of the method. You can also use Chromeleon to control the outputs.

- To turn on a TTL or relay output, set the corresponding output field on the **DETAIL** screen or method **TIMED EVENTS** screen to 1 (on).

- To turn off a TTL or relay output, set the corresponding output field to 0 (off).

```
DETAIL                IDLE
   VIAL#:          TIME:        min      TTL1  1
    INJ#:           VOL:         uL      TTL2  0
METHOD:            TRAY:  2  mL          RLY1  0
   TRAY: 25  20 °C↑  LOOP: 100   uL      RLY2  0
    COL: --    -- °C                   INJ VLV  L
   LOCAL          DIRECT CONTROL        CS VLV  A
  Help Prompt
```
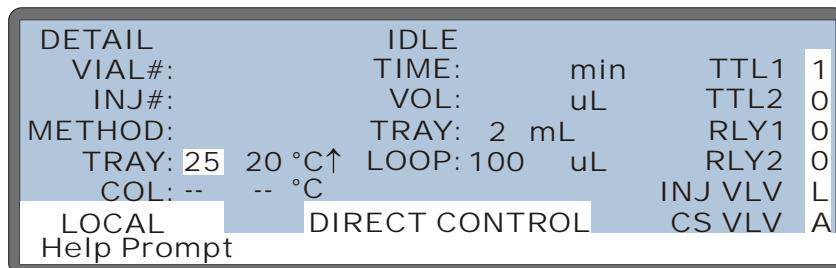
Figure D-4. Detail Status Screen - Direct Control of TTL and Relays

D.2.1 Example TTL/Relay Connections

The following example connections can be used to connect AS50 relay and TTL outputs to TTL inputs on an ICS-1000/1500/2000 system. These connections allow the AS50 to control the following functions:

- Injection valve position

- Pump flow

- Detector autozero

NOTE **Refer to the ICS-1000/1500/2000 operator's manual for an example of how to set up the AS50 and the IC system for** *stand-alone operation* **(operation without Chromeleon software).**
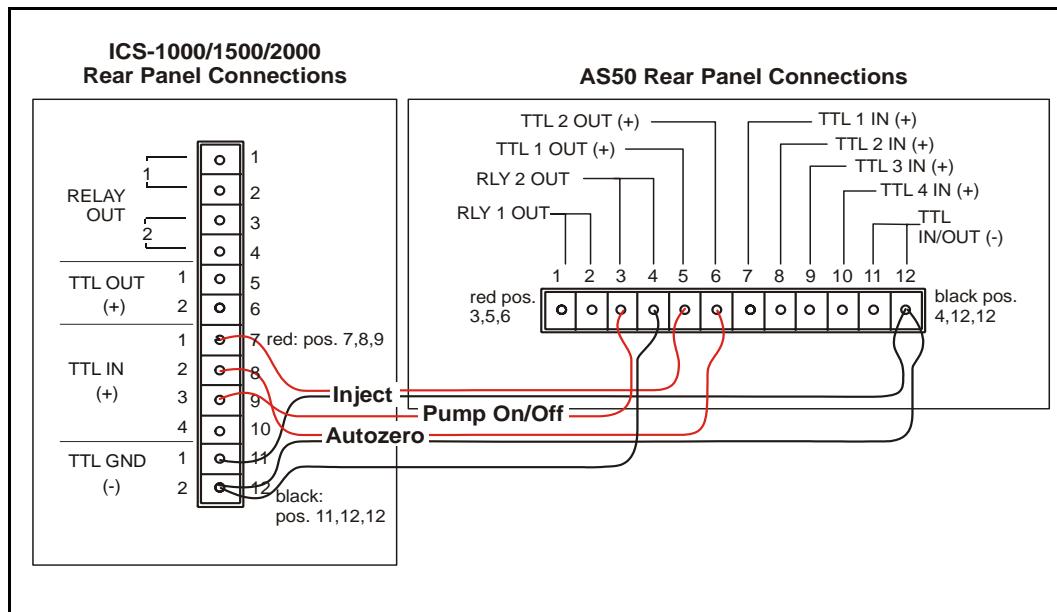
Figure D-5. Example TTL/Relay Connections: ICS-1000/1500/2000

E • Simultaneous Injections

When the AS50 is equipped with the simultaneous injection option a single AS50 can deliver sample to two independent ion chromatography (IC) systems. The IC systems do not need to be the same type.

The simultaneous injection option includes the following components:

• A 5 mL or 10 mL sample syringe

• (Optional) Two injection valves installed in the AS50 autosampler compartment. If the AS50 does not have two injection valves, connection to injection valves in two ICS-1000/1500/2000 systems is required.

• (Optional) Chromeleon software (Release 6.6 or later)

The two IC systems can be controlled independently for calibration, or simultaneously for unknown sample injections. Dual analyses can be performed with only one sample, thus increasing sample throughput and eliminating the need to fill, track, and label two sample vials. Because the systems are plumbed in parallel, contamination that may result when systems are plumbed in series is prevented.

In Chromeleon, the two IC systems and the AS50 are configured into a single timebase and each system is assigned a unique device name and channel. This lets you monitor and control both systems from one Control panel and run all samples in one sequence.

When the AS50 is equipped with the simultaneous injection option, the **INSTALLED OPTIONS** screen lists two injection valves (see Figure E-1).

INSTALLED OPTIONS

SAMPLE TRAY TEMPERATURE CONTROL [✓]
COLUMN TEMPERATURE CONTROL [ ]
SAMPLE PREPARATION [✓]
INJECTION VALVE 2 [✓]
INJECTION VALVE 1 [✓] PEEK

Help Prompt
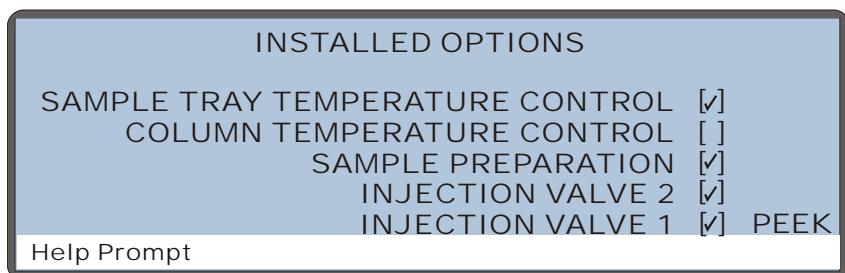
*Figure E-1. Installed Options Screen: Simultaneous Injection Option Installed
(Valves Installed in the AS50 Compartment)*

E.1   Injection Valves (Optional)

The injection valves are six-port, electrically-activated Rheodyne valves. The valves have two operating positions: Load and Inject (see Figure E-2).
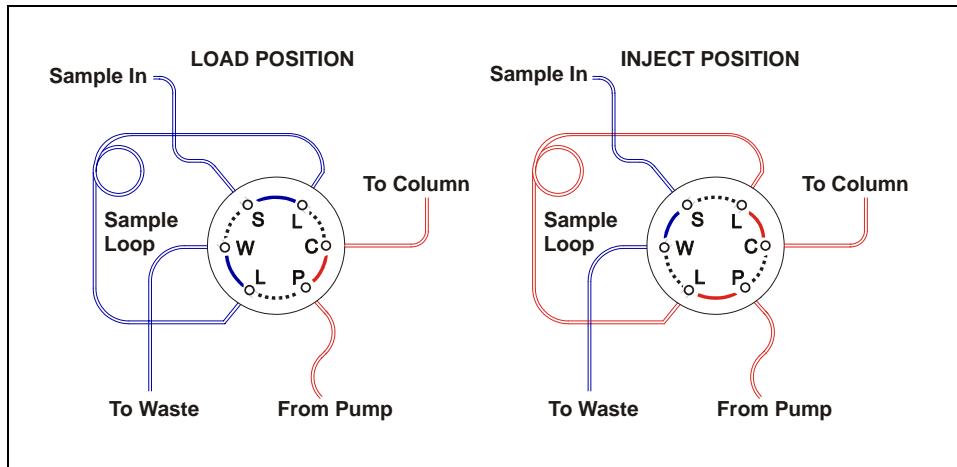
Figure E-2. Injection Valve Flow Schematics

Eluent flows through either the Load or Inject path, depending on the valve position:

*   In the Load position, sample flows from the AS50 inject port line, through the valve, and into the sample loop, where it is held until injection. Eluent flows from the pump, through the valve, and to the column, bypassing the sample loop. Excess sample flows out to waste.

*   In the Inject position, sample is swept to the column for analysis. Eluent flows from the pump, through the sample loop, and on to the column, carrying the contents of the sample loop with it.

E.2   Connecting the Injection Valves

E.2.1   Connecting to Valves Installed in the IC System Modules

This section explains how to plumb two IC systems in parallel.

1. Locate the Y-connector inside the AS50 autosampler compartment.
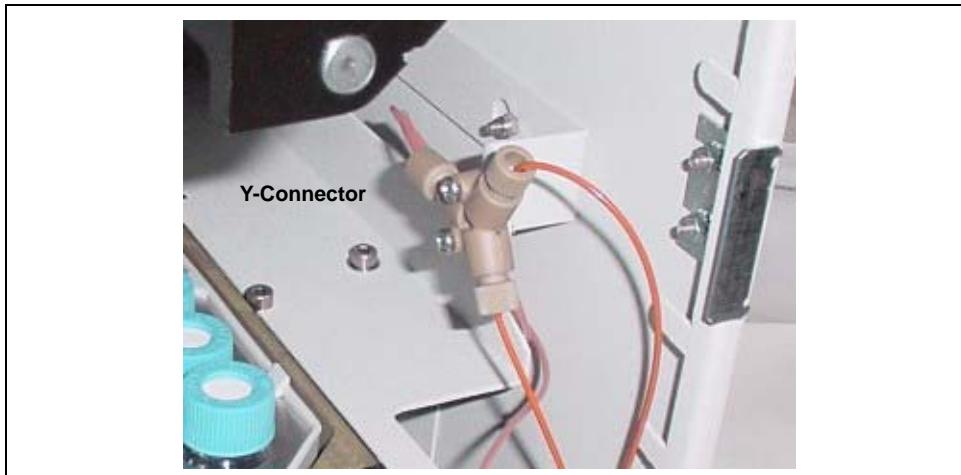
Figure E-3. Simultaneous Injection Y-Connector

2. Route the two lines from the Y-connector through the side slot on the AS50.

3. Connect one of these lines to port S (5) on the injection valve of the first ICS-1000/1500/2000 (see Figure E-4).

4. Connect the other line to port S (5) on the injection valve of the second ICS-1000/1500/2000.
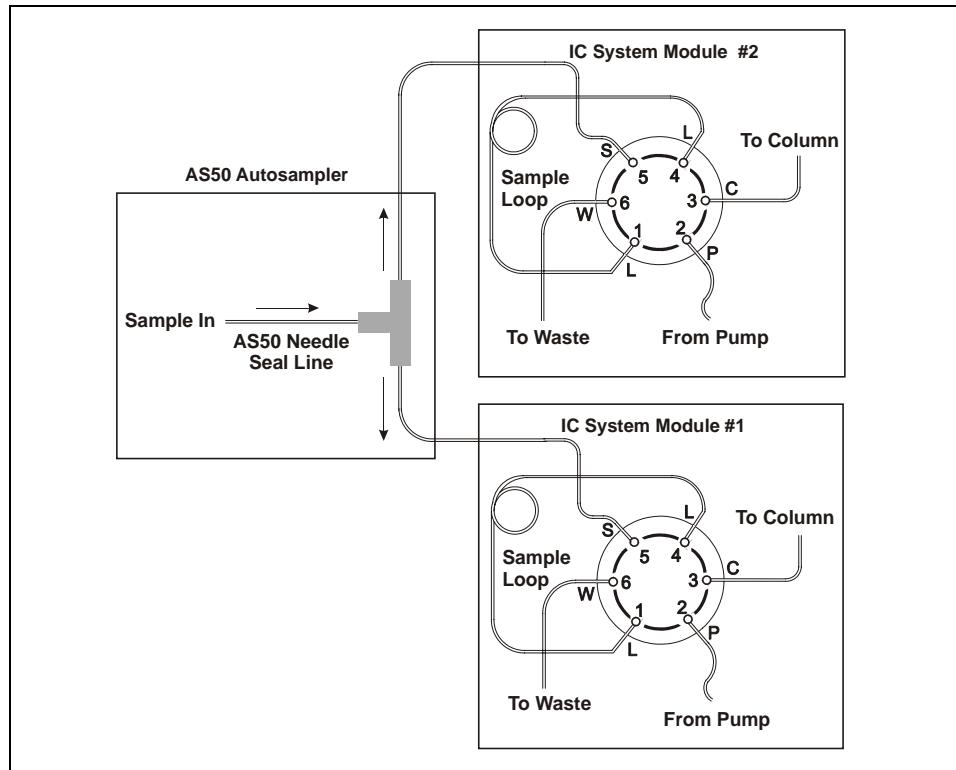
Figure E-4. Injection Valve Connections for Simultaneous Injection: Valves Installed in the IC System Modules

E.2.2   Connecting to Valves Installed in the AS50

1. Route the outlet lines from the pump and column in both IC systems through the slot on the right side of the AS50 (see Figure E-5).
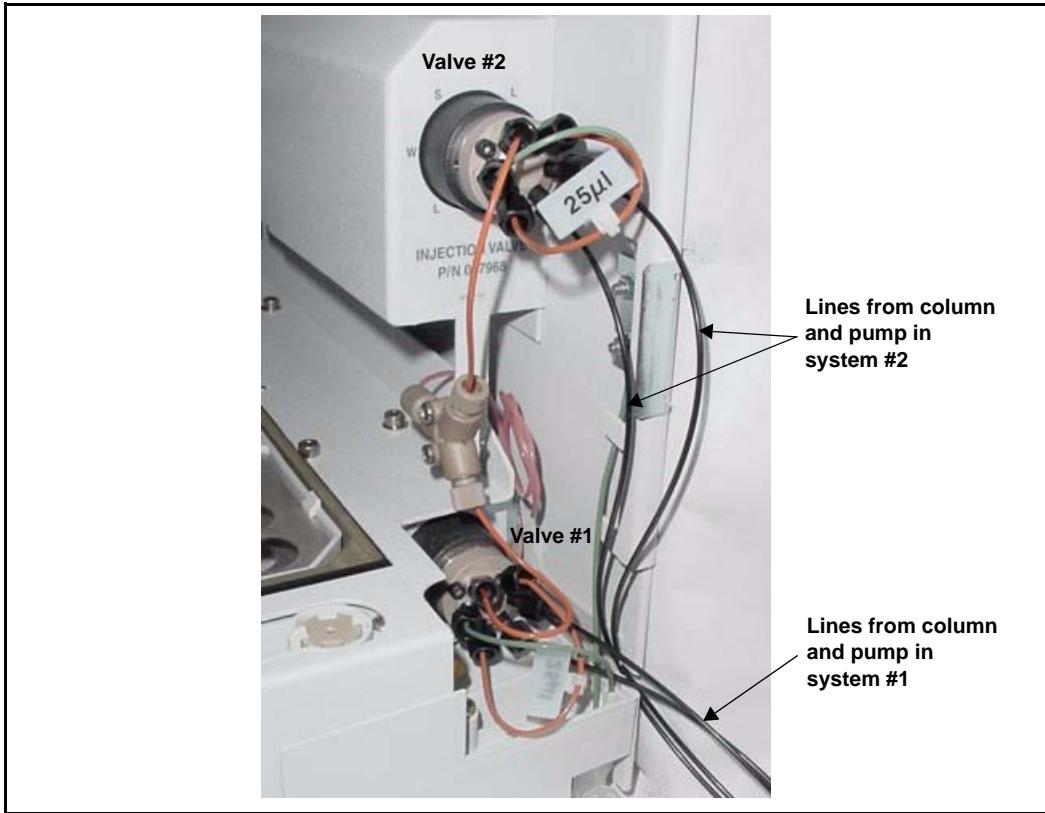
Figure E-5. Routing Pump and Column Lines to AS50 Injection Valves

2. Connect the pump outlet line from system #1 to port P (2) on the bottom injection valve (valve #1) and connect the column outlet line from system #1 to port C (3) on valve #1 (see Figure E-6).

3. Connect the pump outlet line from system #2 to port P (2) on the top injection valve (valve #2) and connect the column outlet line from system #2 to port C (3) on valve #2 (see Figure E-6).
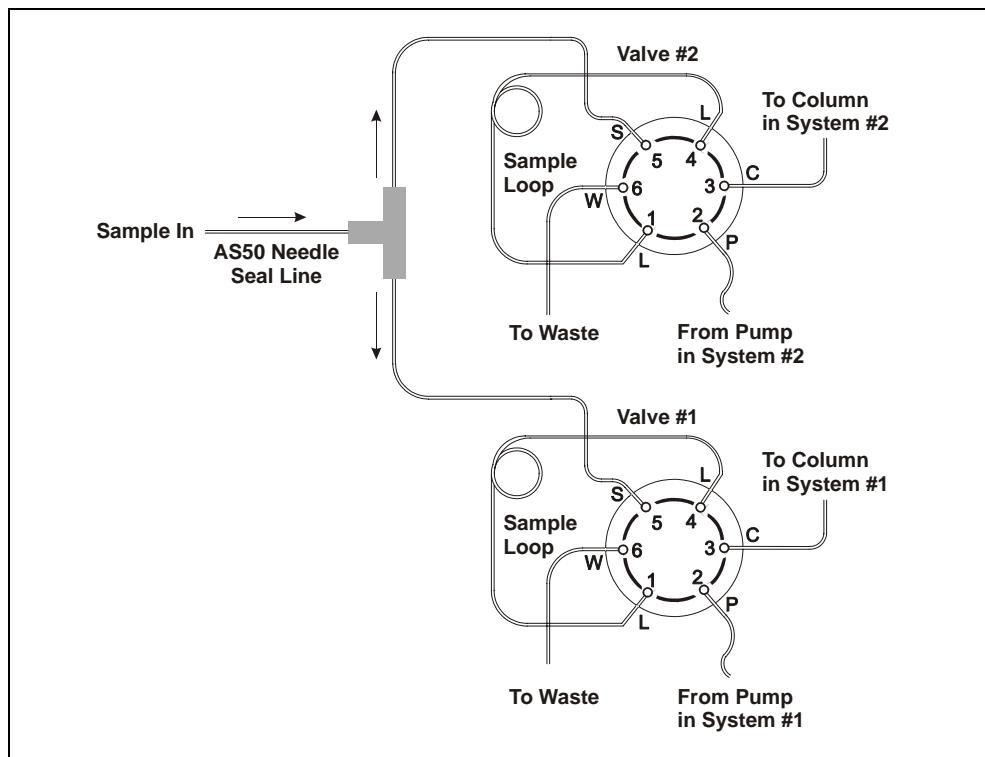
*Figure E-6. Injection Valve Connections for Simultaneous Injection:
Valves Installed in the AS50*

E.3   Specifying the Plumbing Configuration

1. Press **Menu**, **5**, and **3** to go to the **PLUMBING CONFIGURATION** screen.

2. Move the cursor to the **SAMPLE SYRINGE VOLUME** field and press **Select** Δ or **Select** ∇ to select the size of the sample syringe installed in the AS50 (either 5000 or 10000 μL) (see Figure E-7). Press **Enter**.

   When you select a sample syringe size of 5000 or 10000 μL, simultaneous injection option functions are automatically enabled. For example, in the **PLUMBING CONFIGURATION** screen, the **LOOP SIZE** parameter now displays fields for both injection loops (see Figure E-7).

3. Move the cursor to the **LOOP SIZE: V1** field and enter the size of loop installed on injection valve #1. Move the cursor to **LOOP SIZE: V2** and enter the size of loop installed on injection valve #2. Press **Enter**.

```
           PLUMBING CONFIGURATION
         INJECT VALVE:    PEEK
             LOOP SIZE: V1  25 uL  V2  25 uL
 SAMPLE SYRINGE VOLUME:    5000 uL
  SAMPLE SYRINGE CONFIG:   READY
     PREP SYRINGE VOLUME:    5    mL
     PREP SYRINGE CONFIG:   READY
 Help Prompt
```
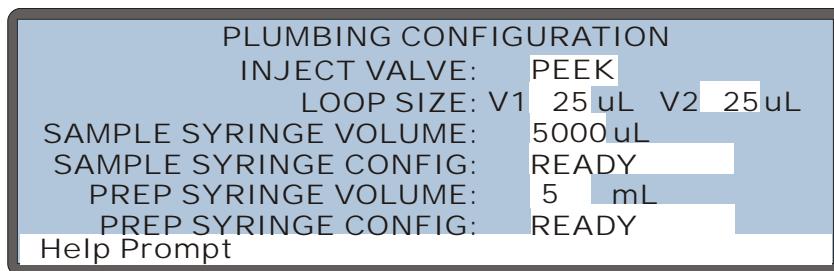
Figure E-7. Plumbing Configuration Screen
Simultaneous Injection Mode

> **NOTE   If the AS50 is controlled by Chromeleon, the AS50 communicates the syringe size selected in the PLUMBING CONFIGURATION screen to the software. If the selected size is 5000 or 10000 μL, simultaneous injection option functions are enabled in Chromeleon.**

E.4 Controlling the Injection Valves from the AS50 Front Panel

In Local mode, you can control the injection valves either directly or in a schedule.

> **NOTE** See **Section E.5** for how to use Chromeleon to control the valves.

E.4.1 Controlling the Injection Valves Directly

To change the position of the injection valves when a schedule is not running:

1. Go to the **DETAIL STATUS** screen (press **Menu** and **2**) (see Figure E-8).

2. Move the cursor to the **INJ VLV 2** or **INJ VLV 1** field, press **Select** Δ or **Select** ∇ to toggle the position, and press **Enter**.

```
DETAIL                  IDLE
   VIAL#:            TIME:      min      TTL1  1
    INJ#:             VOL:       uL      TTL2  0
METHOD:             TRAY:  2  mL         RLY1  0
   TRAY: 25  20 °C↑  LOOP: 100 / 25 uL   RLY2  0
    COL: --    -- °C                   INJ VLV 2  L
   LOCAL         DIRECT CONTROL         INJ VLV 1  L
 Help Prompt
```
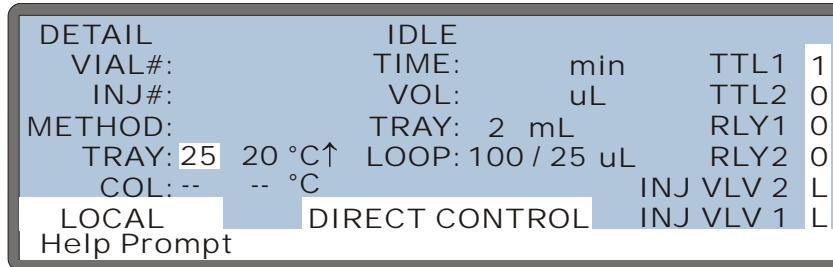
Figure E-8. Detail Status Screen: Simultaneous Injection Mode

E.4.2 Controlling the Injection Valves in a Schedule

To change the positions of the injection valves during a schedule run, set the positions on the method **TIMED EVENTS** screen. By default, both valves are in the Load position at **INIT** and in the Inject position at time zero (see Figure E-9).

TIME	VALVE1	VALVE2	TTL1	TTL2	RLY1	RLY2
INIT	LOAD	LOAD	0	0	0	0
0.00	INJECT	INJECT				

TIMED EVENTS   METHOD: 25

Help Prompt

Figure E-9. Timed Events Screen: Simultaneous Injection Mode

On the **SCHEDULE** screen (see Figure E-10), specify the method number of the simultaneous injection method and enter the injection volume. The specified injection volume is loaded into the sample syringe and then delivered equally to the two sample loops.

SCHEDULE   EDIT 1   SAVE TO 1   RUN 1
MISSING VIAL ACTION: STOP

LINE	VIAL# START- END		INJ/ VIAL	INJ VOL(uL)	METHOD
1	1	- 10	1	1000	25

Help Prompt

Figure E-10. Schedule Screen: Simultaneous Injection Mode

Sample Syringe Size	Injection Volume Range	Default Volume
5 mL	1000 to 5000 μL	1000 μL
10 mL	1000 to 8000 μL	1000 μL

Table E-1. Injection Volumes for Simultaneous Injections

E.5   Setting Up Chromeleon

This section provides an overview of the tasks required to set up Chromeleon to control simultaneous injections.

For detailed instructions on installing Chromeleon and connecting to the PC, refer to *Installing the Chromeleon® Chromatography Management System with a Dionex Ion Chromatograph (IC)* (Document No. 031883). The manual is available on the software CD and the Dionex Reference Library CD.

1. Install Chromeleon on the PC, start the Chromeleon Server, and install the software license.

2. Connect the AS50 and both IC systems to the PC.

3. Turn on the power to each system and the AS50.

4. Add a timebase in the Chromeleon Server Configuration program that includes both systems and the AS50.

5. Assign a unique name to each device in the timebase. See Section E.5.1 for details.

6. Save the configuration.

7. Start Chromeleon and connect to a Control panel. Example Control panels for simultaneous injection are in the **Dionex Templates\Panels\Dionex_IC** folder.

8. Create sequences, programs (PGMs), and quantification methods (QNTs) for simultaneous injections. See Section E.5.2 for details.

E.5.1   Assigning Unique Names to Devices

When you add a device to a timebase, the Chromeleon Server Configuration program assigns a default name to the device. For example, **Pump** for an analytical pump, **ECD** for a conductivity detector, **Pump_ECD** for a combined pump and detector, and **Sampler** for an autosampler. In addition, other components (for example, relays, TTLs, and injection valves) are assigned device names.

If you set up a timebase that includes multiple devices of the same type, you will need to edit the device names to ensure that each one is unique. The Chromeleon Audit Trail displays error messages that identify duplicate device names in a timebase, for example:

⚠ 11:45:59 The symbol "Pump_ECD" already exists.

> **NOTE** **Chromeleon automatically assigns unique names to the two injection valves in the AS50.**

To rename a device, open the device Properties dialog box by double-clicking the device in the timebase. The **General** tab page displays the device name. In the **Device Name** edit box, add **_2** to the existing name.

In the example below, the device name for the second ICS-2000 in a timebase is renamed **Pump_ECD_2**. This device will be identified as System #2 on the Control panel.
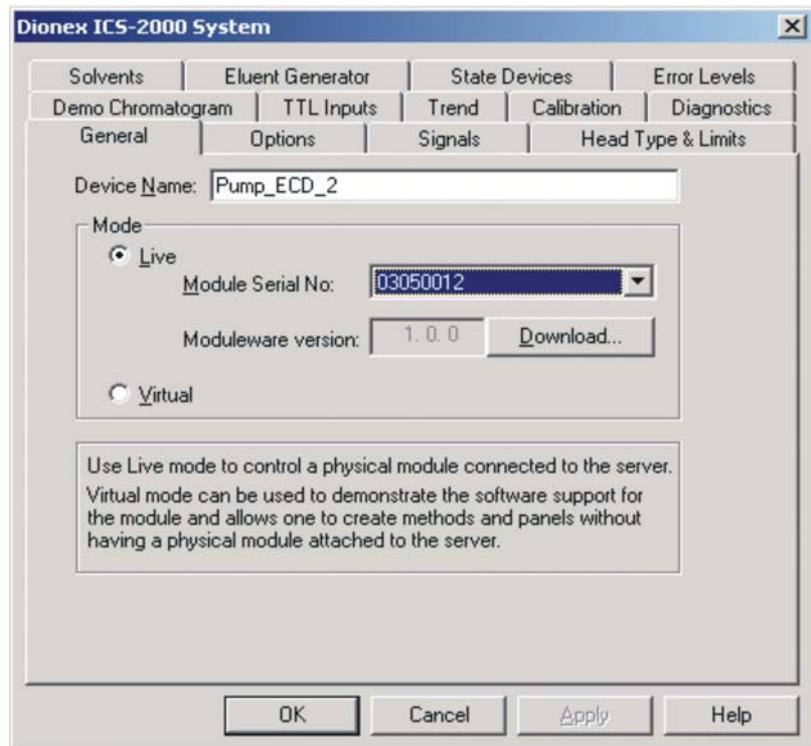
In addition to renaming the device name on the **General** tab page, you will also need to rename signals and other devices associated with System #2. For example, if System #2 is an ICS-2000 (as in the previous example) select the **Signals** tab, click **Change**, and add **_2** to the signal name. Repeat for the remaining signals. See the following example:

> **NOTE** **You only need to rename the enabled signals (i.e., the signals with checks next to their names).**
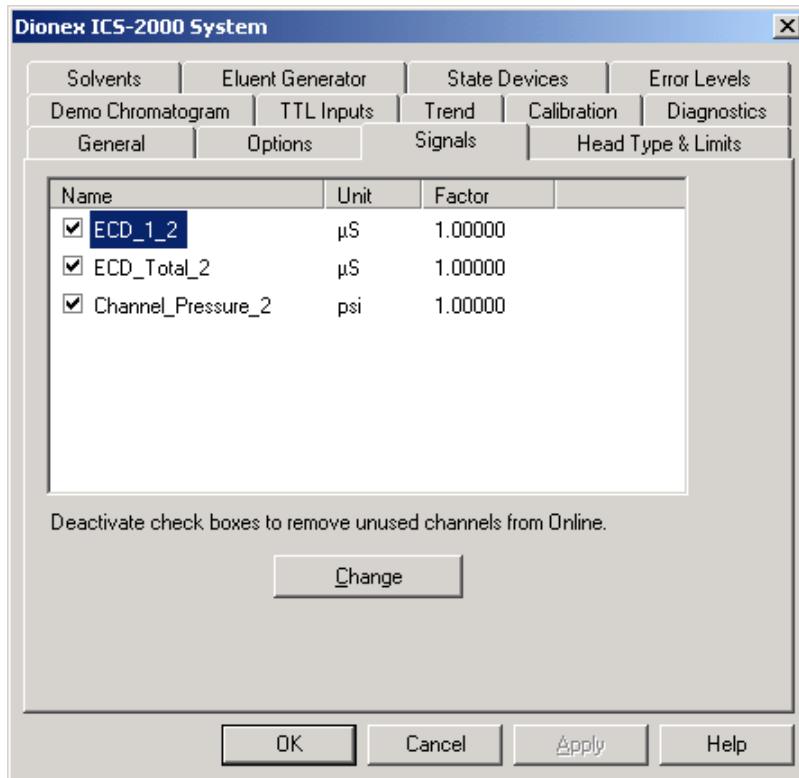
Also, select the **State Devices** tab and add **_2** to the name of each enabled device. Press **F2** to edit a device name. See the following example:
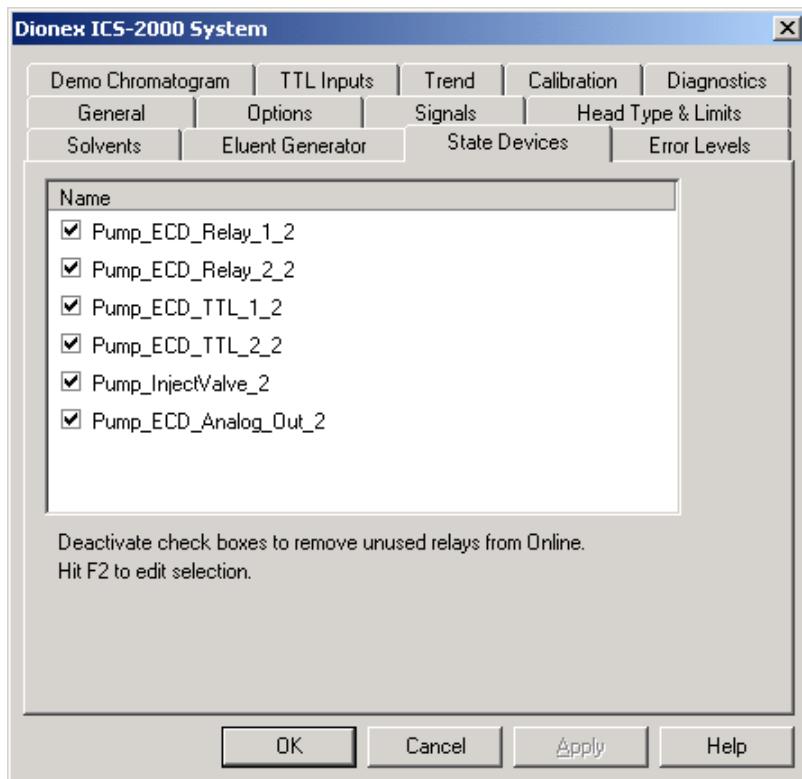
E.5.2   Creating Sequences, PGM Files, and QNT Files

Follow these guidelines when creating sequences, PGM files, and QNT files for simultaneous injection:

- Create one sequence that includes calibration standards for both systems and the unknown samples.

- Create a PGM file for the unknowns that includes commands for controlling both systems.

- Calibrate each system separately by creating separate calibration PGM files.

- Create a single QNT file that includes the components from both systems.

Creating a Method File for Systems Sharing an AS50

For simultaneous injection analyses, create a single method file with all components for each detector channel included in one component list. Use the **Duplicate Column** command on the Peak Table, Amount Table, and Peak Tracking pages of the method to create two extra **Ret. Time** columns; associate each column with a different channel.

> **NOTE** To add a column, right-click in the Ret. Time column and select the Columns>Duplicate Column command on the context menu.

See the Chromeleon Help topic, "How to...: Actions in the QNT Editor: Defining the QNT Method for Several Detectors" for detailed instructions.

In the following example Peak Table, the **Peak Name** column includes the components from two detector channels: one for cations and one for anions. The **Ret. Time ECD_1** column is associated with the cation detector channel and displays only the cations. The **Ret. Time ECD_2** column is associated with the anion detector channel and displays only the anions.
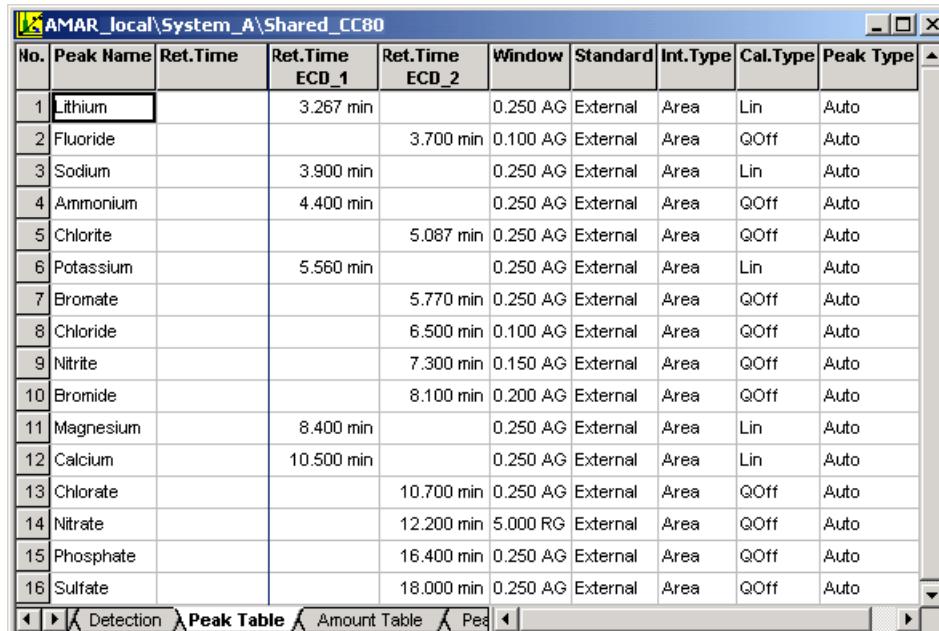
No.	Peak Name	Ret.Time	Ret.Time ECD_1	Ret.Time ECD_2	Window	Standard	Int.Type	Cal.Type	Peak Type
1	Lithium		3.267 min		0.250 AG	External	Area	Lin	Auto
2	Fluoride			3.700 min	0.100 AG	External	Area	QOff	Auto
3	Sodium		3.900 min		0.250 AG	External	Area	Lin	Auto
4	Ammonium		4.400 min		0.250 AG	External	Area	QOff	Auto
5	Chlorite			5.087 min	0.250 AG	External	Area	QOff	Auto
6	Potassium		5.560 min		0.250 AG	External	Area	Lin	Auto
7	Bromate			5.770 min	0.250 AG	External	Area	QOff	Auto
8	Chloride			6.500 min	0.100 AG	External	Area	QOff	Auto
9	Nitrite			7.300 min	0.150 AG	External	Area	QOff	Auto
10	Bromide			8.100 min	0.200 AG	External	Area	QOff	Auto
11	Magnesium		8.400 min		0.250 AG	External	Area	Lin	Auto
12	Calcium		10.500 min		0.250 AG	External	Area	Lin	Auto
13	Chlorate			10.700 min	0.250 AG	External	Area	QOff	Auto
14	Nitrate			12.200 min	5.000 RG	External	Area	QOff	Auto
15	Phosphate			16.400 min	0.250 AG	External	Area	QOff	Auto
16	Sulfate			18.000 min	0.250 AG	External	Area	QOff	Auto

AMAR_local\System_A\Shared_CC80

Detection / **Peak Table** / Amount Table / Pea

If two anion (or two cation) detector channels were being used, the measured retention time for each anion (or cation) would appear in both **Ret. Time** columns, as in the following example:
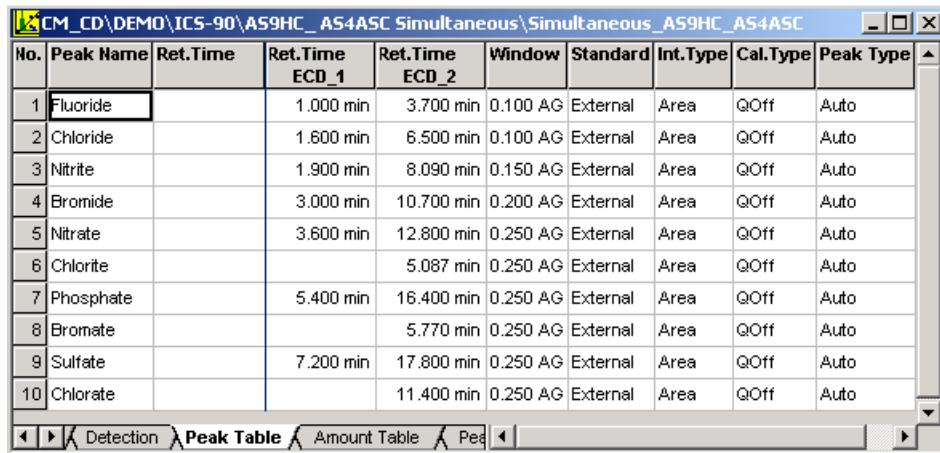
CM_CD\DEMO\ICS-90\AS9HC_ AS4ASC Simultaneous\Simultaneous_AS9HC_AS4ASC

No.	Peak Name	Ret.Time	Ret.Time ECD_1	Ret.Time ECD_2	Window	Standard	Int.Type	Cal.Type	Peak Type
1	Fluoride		1.000 min	3.700 min	0.100 AG	External	Area	QOff	Auto
2	Chloride		1.600 min	6.500 min	0.100 AG	External	Area	QOff	Auto
3	Nitrite		1.900 min	8.090 min	0.150 AG	External	Area	QOff	Auto
4	Bromide		3.000 min	10.700 min	0.200 AG	External	Area	QOff	Auto
5	Nitrate		3.600 min	12.800 min	0.250 AG	External	Area	QOff	Auto
6	Chlorite			5.087 min	0.250 AG	External	Area	QOff	Auto
7	Phosphate		5.400 min	16.400 min	0.250 AG	External	Area	QOff	Auto
8	Bromate			5.770 min	0.250 AG	External	Area	QOff	Auto
9	Sulfate		7.200 min	17.800 min	0.250 AG	External	Area	QOff	Auto
10	Chlorate			11.400 min	0.250 AG	External	Area	QOff	Auto

◄ | ► | Detection \ **Peak Table** \ Amount Table \ Pea ◄ | ►

F • Unpacking Instructions

Figure 1.
Fully-packed AS50 with foam spacer on top of geometric foam pack

1. Remove the outer cardboard sheath and Ship Kit spacer (see Figure 2).

Figure 2.
AS50 and Ship Kit with the outer cardboard sheath and Ship Kit spacer removed
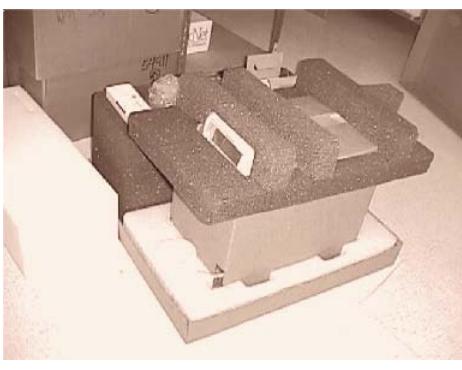
Figure 3.
AS50 with foam top cap installed

2. Remove the foam top cap.

	Figure 4. *AS50 with sleeve assembled over cradle* **Note**: The AS50 is inserted into the bottom foam of the main shipping container. The tubing is coiled in front of the AS50. 3. Using the hand holes in the cradle, place the AS50 on the bench. 4. Remove the sleeve (see Figure 5).
	Figure 5. *AS50 setting on cradle (with the sleeve removed)* **Note**: The rear edge of the cradle and the rear edge of the AS50 are aligned.
	Figure 6. *AS50 fully wrapped and taped within polyethylene bag* 5. Remove the polyethylene bag (see Figure 7). Be careful not to damage the drain tube.

Figure 7.
AS50 sitting on foam spacer inside polyethylene bag

Note: The rear of the AS50 is aligned with the rear edge of the foam.

Figure 8.
2-in wide masking tape securing tubing within the recess at the rear of the AS50

6. Remove the masking tape.

7. Remove the coiled tubing inside of the recess (see Figure 9). Be careful not to damage the tubing.

Figure 9.
Coiled inlet tubing inserted into the recess in the rear of AS50

Figure 10.
Typical items shipped in Ship Kit geometric foam pack

Note: All items are in polyethylene bags and wired closed with sturdy ties.

8. Remove the items from the geometric foam pack.

Note: For a single syringe, a foam insert is placed on the left.
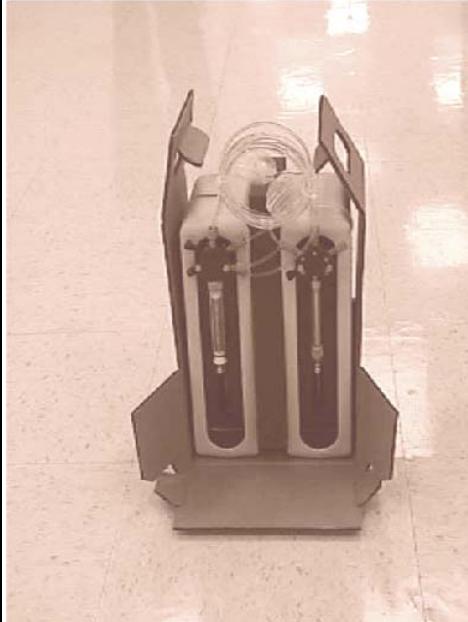
Figures 11 and 12.
Dual syringes with pigtails bagged and wired closed with sturdy ties. Syringes packed with foam insert placed between them. Both handles are tied together with sturdy ties

9. Remove the sturdy ties and the polyethylene bag.

10. Open the front of the sheath and use the handles to set the pack and syringes on top of the main AS50.

11. Slide the syringes into positions (see Figure 13).

Figure 13.
Fully assembled dual syringes with bottle

Figure 14.
Shipping bracket hooked into frame and attached to sample arm and chassis with screws

12. Remove the sturdy tie, the two cap screws, and the bracket (see Figure 15).

Figure 15.
Shipping bracket with M4 Allen cap screws
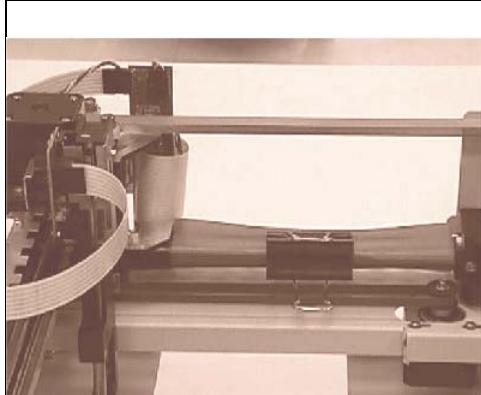
Figure 16.
Polyethylene sleeve assembled (clipped) to shaft to eliminate sliding of sample arm during shipment

13. Remove the clip and sleeve (see Figures 17 and 18).
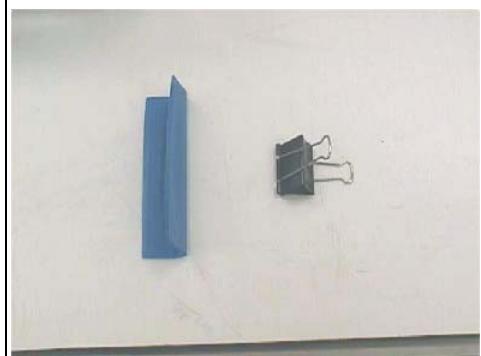
Figure 17.
Polyethylene sleeve and clip
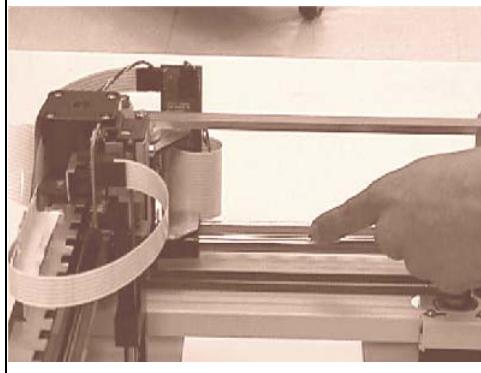
Figure 18.
Shaft with polyethylene sleeve removed

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